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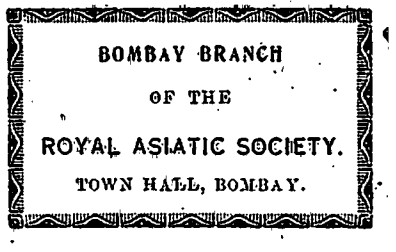

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WOOL

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Working Party Reports

WOOL

LONDON
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1947

WOOL WORKING PARTY

(constituted March 1946)

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ASSISTANT SECRETARY: Mr. L. E. M. Taylor

TERMS OF REFERENCE

To examine and enquire into the various schemes and suggestions put forward for improvement of organisation, production and distribution methods and processes in the wool textile industry, and to report as to the steps which should be taken in the national interest to strengthen the industry and to render it more stable and more capable of meeting competition in the home and foreign markets.

Note: Matters concerning the relations between employers and employees which are dealt with by employers' federations and trade unions are outside the scope of the enquiry.

To the President of the Board of Trade

Sir,

The undersigned members of the Wool Working Party beg to submit their Report hereto annexed.

A delegation of members was accorded facilities by the Swedish wool textile industry for a visit of inspection and another delegation was afforded similar facilities by the Swiss wool textile industry (in particular by the wool textile machinery making industry in that country) and by the industry in France. The knowledge and information thus courteously conveyed to our delegates has been of great value. Reports upon their visits are included in Appendices I and II.

At the time of the constitution of our Party arrangements had already been made that Scottish aspects of the matters in question should be examined by a Scottish Committee which would meet separately in Scotland and present its conclusions to us. After some considerable but unavoidable initial delay this Committee was constituted as follows: Chairman, Sir Wilfred Ayre; Employers' Representatives: Mr. W. H. Ballantyne, Mr. J. Douglas Hood, Mr. W. Thow Munro, C.B.E.; Employees' Representatives: Mr. J. Dougherty, Mr. Hugh Craig, J.P., Mr. W. Quin, J.P.; Independent Member: Principal J. Cameron Smail, O.B.E., LL.D., F.R.S.E.; Co-opted Member: Mr. James Barr. As we have not yet received the conclusions of the Committee we will deal with the matter in a further Report.[1]

We associated with us during the course of our enquiry Mr. A. B. Archer and Mr. C. D. Fletcher, respectively representative of employers and workers in the West of England District.

(Signed)

November, 1946.

R. V. NIND HOPKINS, CHAIRMAN.

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L. E. M. TAYLOR, Asst. Secretary.

[1] Since received and incorporated.

ACKNOWLEDGMENTS

WE are under great obligation to many individuals and corporate bodies that provided us with memoranda and with evidence both written and oral. All available information for which we asked was readily given. Our thanks are also due to those who offered us opportunities to visit a number of factories and organisations.

We received much valuable material and assistance from Sir Harry Shackleton the Wool Controller and members of his organisation, of whom we would specially mention Mr. A. R. Baines, C.B.E., Deputy Controller, and Mr. C. F. Mallett, whose help on statistical and similar questions was very great. We have also received considerable help from Mr. J. W. Burdett of the Ministry of Supply Costing Department.

We express our sincere thanks also to Mr. R. G. Bailey, C.B.E., who made the arrangements for the visit to Sweden and accompanied the delegation there: to Lt. Col. Hubert Walker and Mr. Frank Booth who accompanied the delegation to France and Switzerland: and to Mr. F. Heppenstall and Mr. N. Newton who served as co-opted members on our sub-group concerned with statistical and accountancy questions.

We wish to record our appreciation of the many services rendered to us during the course of our enquiry by our Secretary, Mr. W. L. B. Fairweather, and also by our Assistant Secretary, Mr. L. E. M. Taylor; and we wish to acknowledge the important help received from Government Departments, in particular from Regional Offices of the Ministry of Labour and National Service and of the Board of Trade and from the Factory Department of the first-named Ministry, and also from the East and West Riding Regional Board for Industry.

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PART I

Historical and Economic Survey

CHAPTER I. HISTORICAL SURVEY

FEW manufacturing industries have taken so prominent a place in social history as wool textiles. Almost from the earliest times, wool was one of the principal objects of trade, powerfully affecting commercial policy and international intercourse. It was supplied under increasingly complex dealings, and on an ever larger scale, for the manufacture of wool products of all kinds, from apparel to floor coverings and tapestries to blankets. Long before the Industrial Revolution, the wool textile industry had begun to reflect and assist the growth of capitalist enterprise, providing a laboratory for new techniques in commercial and industrial organisation and for the application of mechanical power. Wherever the industry grew, there were also to be found the beginnings of factories and towns, a greater accumulation of capital, and all that complicated division of labour by which commerce thrives and life acquires variety.

In Britain in particular the early history of economic development is dominated by wool. Initially it was the raw material that contributed most to the growth of British exports. Later, the manufacture of wool cloth, which had begun in Roman times, developed rapidly until by 1700 Britain was the largest manufacturer and exporter in the world and was so heavily dependent on the industry that two-thirds of her exports consisted of wool manufactures. Among the influences that contributed to the growth of the industry were two that were to prove of advantage again and again: the abundance of raw materials of high quality, and the enterprise of alien immigrants.

LOCATION

FROM very early times production was localised chiefly in East Anglia and the South West. In 1470, according to the aulnage returns, the three leading counties were Suffolk, Somerset and Yorkshire, with Lancaster not far behind and producing one eighth of the total output of woollen cloths. East Anglia had practically a monopoly of the worsted side of the industry until well into the 18th century, and Norwich, the chief centre, was the largest manufacturing town in England. In the West of England, the leading woollen district, the vast sheep grazing areas of the Wiltshire, Hampshire and Oxfordshire Downs, the Cotswold, Quantock and Mendip Hills and the Devon Moors supplied the raw materials for cloth of the highest quality, and the fast running streams of these neighbourhoods provided water in abundance to work the water-wheels and process the cloth. In the Cotswold villages, the ancient churches, mansions and cottages still testify to the prosperity of the trade in broadcloths, flannels, blankets, etc. in the days of the domestic system. Further west, the production of serges, an important export, was concentrated in Devon around Exeter. In Scotland, cottage industry was widely scattered, sheep farming leading to local production in most parts of the country.

Up to the time of the Industrial Revolution the industry had made comparatively little progress in Lancashire and the West Riding of Yorkshire, and production in those districts was largely confined to coarse cloths. Like Norwich to-day, Bradford was more renowned for boots than for woollen goods. Towards the middle of the 18th century, however, there began a rapid expansion in the West Riding and by 1850 this district had far outdistanced all others. The change in location was partly due to the advantages of the Pennine towns in water power, in which East Anglia was deficient, and later to the availability of cheap coal from local mines. The older centres were less favourably placed to take advantage of inventions involving the use of mechanical power. In addition, the example of cotton in adjoining districts, the absence of a large established industry committed to existing methods of production, and the greater resilience of a new and expanding manufacturing centre, gave the West Riding far more incentive and opportunity to make use of new techniques. Other advantages lay in low wages and a plentiful supply of labour. The skilled workers in East Anglia, accustomed to a higher standard of living, were in no position to compete with the hardier Yorkshireman.

For the last hundred years there has been little change in the location of the industry. By 1850 the West Riding of Yorkshire was firmly established as the leading centre of manufacture; 90 per cent of the worsted trade and well over 50 per cent of the woollen trade was carried on in that district, nearly all between the Wharfe and Calder and Colne valleys. For every worker in the once thriving centre of Norwich there were over a hundred in the West Riding. Even at that date, too, there was the same specialisation within the district that still distinguishes the trade of Dewsbury and Batley from Keighley and Halifax, and of Huddersfield from Bradford. Dewsbury employed ten times as many men in woollens as in worsteds; Keighley concentrated even more heavily on worsted. The dependence of the West Riding towns on the wool textile industry was no less than it is now. In Bradford 42 per cent of the men over 20 were employed in the industry; in Huddersfield, 47 per cent. In 1939 the proportions for all workers in these towns were 44 and 39 per cent respectively.

So far as there has been any change over the century, it has been in the direction of still further concentration in the West Riding. In 1851 rather less than two-thirds of the workers in the industry were employed in the West Riding; in 1935 the proportion was nearly three-quarters. This change reflected the gradual disappearance of many of the small woollen mills that were scattered all over the country and made little or no use of mechanical power. In the worsted section of the industry only 7-8 per cent is located outside the West Riding; Bradford alone has three-quarters of the combs and over a third of the worsted spindles. Lancashire and Leicester are the only other centres of any importance. In the woollen section there is more dispersion, but two-thirds of the industry is located in the West Riding. The remaining third includes two areas famous all over the world for the quality of their products: Scotland and the West of England. There are also some large mills in Lancashire.

Within the West Riding there is a good deal of specialisation by locality. The worsted section of the industry is located mainly to the west and north, and the woollen section to the east and south. Bradford is the main commercial centre, does most of the woolcombing, and together with Halifax and Keighley, produces a wide variety of worsted yarns and dress goods. Huddersfield carries on both branches of the trade, specialising in high quality worsteds for men's wear and

also producing fine woollens. Further east, in Dewsbury and Batley, is the main centre for the cheaper woollen goods. Leeds is engaged in the manufacture both of woollen and worsted goods but only on a relatively small scale in relation to the size of the town: only 2 per cent of the insured population is employed in the wool textile industry compared with 40 per cent or more in most of the other large centres in the West Riding.

In the West of England the trade is centred in the districts of Ashburton, Bath, Chipping Norton, Dursley, Frome, Stroud, Trowbridge, Wellington, Westbury and Witney employing some 5,000 workers with 2,000 looms. Each district contributes its own specialities in overcoatings, flannels, serges, mechanical cloths, billiard cloths, naval and military faced cloths, hunting and riding cloths. Some of the specialities, such as the famous Witney blankets and the scarlet cloths of Stroudwater, are of great antiquity.

In Scotland the industry is located in well defined areas, making characteristic Scottish woollen products. The most important centre is in the Borders; others are in the Hillfoots north of the Forth, the Northern areas from Aberdeen to Inverness, and in the Hebrides, noted for Harris tweed. Scottish tweeds, scarves, etc., are mainly produced in these areas.

TECHNIQUE

BY 1850 manual processes had by no means been entirely displaced by mechanical. Not much more than half the total of 250,000 workers then employed in the industry were factory workers. From 1850 onwards there was very little further expansion in employment, but productivity rose with the increased use of mechanical methods of manufacture and improvements in the speed and efficiency of machinery. Between 1851 and 1911, without any appreciable change in numbers employed, the weight of raw material, including hair and recovered wool, that was absorbed by the industry, increased from about 240 million lbs. to about 850 million lbs.: that is, by some 250 per cent.

EMPLOYMENT

FOR the past hundred years the number of workers earning their living in the industry has fluctuated round a total of 250,000:

TABLE 1

EMPLOYMENT IN THE WOOL TEXTILE INDUSTRY, 1851-1911
(excluding carpets and rugs)

Year	Males	Females	Total
1851	141,500	112,500	254,000
1861	122,000	113,000	235,000
1871	123,500	139,500	263,000
1881	111,000	141,000	252,000
1891	121,500	153,500	275,000
1901	97,000	138,000	235,000
1911	105,500	142,500	248,000

Source: Census of Population and Survey of Textile Industries.

In the course of the century, apart from cyclical movements between boom and depression, the industry has had to weather a sharp check to its previous steady growth in the middle 'seventies'; the McKinley Tariff in the United

States in 1895, when it was predicted that grass would grow in the streets of Bradford; the increase in hostile tariffs and in continued competition up to 1914; the still greater increase in tariffs and the growth of domestic production in foreign countries during and after the first World War; and the competition of other fibres. All of these changes have been met without more than a relatively small variation in employment.

At one time the majority of workers were men, but, omitting domestic workers, the figures of factory employment alone show a majority of women from the first returns in 1839 onwards. In the woollen section of the industry, men and women are employed in roughly equal numbers; in wool sorting and combing, most of the workers are men; and in worsted spinning and weaving, women outnumber men by over two to one, the preponderance of women being particularly heavy in spinning. The industry is also heavily dependent on juveniles who accounted for 21 per cent of those employed in 1907 and for 18 per cent in 1937.

TABLE 2

EMPLOYMENT IN THE U.K. WOOL TEXTILE INDUSTRY

	Men (000's)	Women (000's)	Total (000's)	Index of Employment	Proportion under 18 years
1907 ..	112.3	147.6	259.9	100	20.7
1912 ..	121.7	157.9	279.6		22.2
1924 ..	119.0	157.5	276.5	102	17.0
1930 ..	97.6	132.7	230.3	85	15.1
1933 ..	100.3	135.3	235.6	87	12.8
1935 ..	104.7	137.5	242.2	90	14.8
1937 ..	108.1	141.8	249.9	92	17.6

Source: "Facts and Figures" (issued by The National Wool Textile Export Corporation in 1944). Based on Census of Production and I.D.A.C. Inquiries.

Figures of workers engaged in the manufacture of wool carpets are included. These workers numbered 24,540 in 1930 and 29,548 in 1935; corresponding figures for other years are not known. Workers in firms employing not more than ten persons are excluded; so far as is known, such workers form less than 2 per cent. of the total number in the industry.

In the years between the wars, the industry suffered severely from unemployment, which reached a peak of 37 per cent in 1931. But there was far less pressure on workers to leave the industry and seek employment elsewhere than there was across the Pennines in the cotton industry. From 1912 to 1937 the drop in the numbers in employment in the wool textile industry was 30,000, or 11 per cent: in cotton, the drop was 260,000, or 42 per cent.

PRODUCTION

THE main changes in production since 1907 are shown in Table 3. The output of tops did not vary much from the average of the census years 1907 and 1912; exports were also well maintained and imports were insignificant. This section of the industry, therefore, has enjoyed comparative stability and has not had to adjust itself to the same extent as others to a long-term contraction

in demand, though it did take measures to eliminate redundant capacity after 1935. The output of yarn tended to increase between 1907 and 1937, the increase being at about the same rate in woollen and worsted yarns. The output of tissues after an initial fall between 1912 and 1924, fell still further in 1930–1 but recovered thereafter. By 1937 the output of each section, in terms of weight or area, was very close to that of 1924 and all the ground lost in the intervening depression had been recovered.

TABLE 3

PRODUCTION OF TOPS, YARNS AND TISSUES

	Output of Tops		Output of Yarn		Output of Tissues[1]	
	Million lbs.	Index	Million lbs.	Index	Million sq. yds.	Index
1907	243.5	100	446.0	100	454.7	100
1912	304.5		565.1		481.0	
1924	285.5	104	554.5	110	475.7	84
1930	224.5	82	385.9	76	343.9	61
1933	309.5	113	522.0	103	413.3	73
1934	274.8	100	519.2	103	420.8	74
1935	307.5	112	543.0	108	439.2	78
1937	278.5	102	565.8	112	474.6	84

[1] Figures for 1907 and 1912 are in linear yards, but adjusted approximately to sq. yds. in the index in the final column.

Source: "*Facts and Figures.*"

EXPORTS

BEFORE the war of 1914–18, three significant trends in exports were apparent. The first was towards a decline in the relative importance of wool manufactures in total British exports. In the 1870's they formed 13 per cent by value of the total; forty years later the proportion had fallen to 9 per cent. In some products there was an absolute decline; exports of woollen and worsted tissues, for example, fell from a peak of 324 m. linear yards over the years 1870–4 to 174 m. linear yards over the years 1909–13, the reduction being entirely, or almost entirely, in worsted tissues. The decline in real volume was less than these figures indicate owing to the concentration of the reduction on stuffs and dress goods, which formed nearly 90 per cent of the total in the 1870's and less than a quarter in 1913. Cloths, coatings, etc., increased threefold over this period so that there was a rise in the average width and value of the cloth exported. In other products, there was a rapid increase: exports of tops and yarns, for example, were higher over the years 1909–13 than ever before. Taking the trade as a whole, there was either no significant expansion in the volume of exports after 1870 or an actual decrease.

It follows that the increase in total production that undoubtedly took place was absorbed by British consumers, and that the industry was increasingly dependent on the home market. But the proportion of workers engaged on export work was still as high as 50 per cent of the total number in 1907.

The stagnation in exports was not due to the success of other exporting countries in capturing British markets. On the contrary, Britain was steadily gaining ground. Taking wool textile manufactures (including hosiery but

excluding tops and yarns) the United Kingdom's share of the combined exports of the United Kingdom, France and Germany was 41.6 per cent in 1880–83 and 53.9 per cent in 1909–13. What was happening was that consuming countries were meeting a larger part of their own requirements; world trade in wool goods was consequently contracting; and of this diminishing volume of trade Britain was retaining a large and increasing share.

For a time after the war 1914–18, exports were well maintained and the British share of world trade in wool manufacture continued to increase. In 1925, Britain exported 60 per cent of the combined exports of the United Kingdom, France and Germany. Even when allowance is made for countries such as Italy, Czechoslovakia and Belgium, which had gained ground in the post-war period, and for other exporters of less importance, Britain's share in total exports came to 46 per cent in 1925 and was slightly higher than in the years before 1914.

Once other countries had had time to recover from the effects of the war, British exports began to fall, but it was not until the world slump after 1929 that the fall became really catastrophic. From 100 (measured by weight) in 1928, world exports of wool tissues sank to an average of 56 for the three years 1936–8; over the same period, British exports of tissues fell from 100 to 64. The reduction in yarns was on an equal scale, world exports falling from 100 to 57 and British exports from 100 to 66. In both tissues and yarns British trade suffered less than the world average, and much less than the trade of France and Germany. In tops there was actually a large increase in British exports in face of contraction in world trade. An expanding trade in tops had been a feature of the years before 1913, when foreign countries were building up a wool textile industry with the help of imported tops and worsted yarns. When the trade ceased to expand after 1928 the trend to self-sufficiency continued nonetheless; for the main reason, alike for the steadiness of the total and for the rise in the British share of world trade in tops, was the use by Germany of her woolcombing capacity to meet her own requirements and her withdrawal from export trade.

TABLE 4

INDICES OF EXPORTS OF TOPS, YARNS AND TISSUES, BY WEIGHT
1928 = 100

Year	World Exports of			United Kingdom Exports of		
	Tops	Yarns	Tissues	Tops	Yarns	Tissues
1928 ..	100	100	100	100	100	100
1929 ..	92	97	96	97	96	91
1930 ..	89	87	78	85	76	68
1931 ..	95	82	65	82	72	51
1932 ..	95	56	43	124	78	47
1933 ..	108	63	46	135	88	54
1934 ..	91	61	49	124	88	59
1935 ..	103	58	49	165	84	63
1936 ..	99	59	53	153	76	68
1937 ..	93	59	62	117	65	71
1938 ..	83	54	52	97	57	54

Source: Imperial Economic Committee and "Facts and Figures."

The net effect of all these changes was to continue the trends that had been at work since the 1870's towards an increased dependence on the home market

and an increasing preponderance over foreign competitors in the dwindling markets overseas. Exports of wool manufacture, however, maintained their importance in relation to other British exports and in the years before the war were still 9 per cent of the total—the same proportion as in 1907.

CHAPTER II. THE SCOPE AND ORGANISATION OF THE INDUSTRY[1]

THERE are two main branches of the industry, generally referred to as the woollen and worsted sections. The difference lies mainly in the manufacturing processes employed, but partly also in the raw material used. In the worsted section of the industry, wool and other fibres, including mohair and alpaca, go through a series of processes of which the main intermediate products are tops and yarns; while in the woollen section, a wide range of materials, chiefly raw wool and frequently including fibres recovered from rags, is spun into yarn without the manufacture of any intermediate product corresponding to tops. In Britain (and also on the Continent) the organisation on the worsted side of the industry is mainly horizontal, in the sense that the manufacture of tops, yarns, and cloths are generally undertaken by separate firms; while on the woollen side, the normal organisation is vertical in the sense that all the processes are generally undertaken by a single firm.

In the manufacture of worsted cloth the processes are more complicated and delicate than the preliminary stages in woollen manufacture. The raw material has normally to be of good, even length and consists largely of merino and fine crossbred wools, i.e. 56's and upwards. Some worsted cloths, however, such as moquettes and interlinings are made from coarser qualities of wool.

After sorting, blending and scouring, the wool is carded and then combed, with the object of separating the shorter fibres, or noils, from the longer fibres, or tops and of eliminating vegetable impurities. The noils are disposed of to the woollen trade or to the makers of felt while the tops become the raw material for the spinning of worsted yarns. The object throughout the manufacture of worsted yarn is to keep the fibres as nearly as possible parallel to one another and to make use only of the longer and more uniform fibres.

In woollen manufacture, the fibres are of varying lengths and lie more irregularly. Use is made of a wider range of materials and the quality of the finished product also shows greater variety. The materials include raw wool of all types, including the highest qualities, but the proportion of crossbred types is higher than in the worsted trade. Some firms make use exclusively, or almost exclusively, of raw wool, while others mix in recovered wool (shoddy and mungo), and noils and wastes obtained from other manufacturers, the materials being blended before they are spun into yarn.

Although woollen yarns are, in general, less expensive than worsted yarns, it must not be assumed that they are merely cheaper and inferior varieties. There are many effects that can be obtained with woollen cloth that would be difficult or impossible with worsted; for example, in overcoatings, tweeds, blankets and billiard cloths. Woollen cloth, moreover, generally offers more scope in dyeing and finishing for quality effects and is less restricted in colour and design.

[1] A summary of the processes of the industry and a glossary of the main technical terms are given in Appendices VIII and IX.

THE SECTIONS OF THE INDUSTRY

A GENERAL view of the industry is most readily obtained from the statistics of gross and net output and employment contained in the Census of Production returns. The main figures for 1935, the last year for which they are available, are shown in Table 5 :—

TABLE 5

STRUCTURE OF THE BRITISH WOOL TEXTILE INDUSTRY, 1935

(*Carpet and rug manufacturers and firms employing less than* 10 *persons are excluded.*)

	Number of Establishments	Gross Output (i.e., Sales Proceeds) £000	Net Output (i.e., Value added to Raw Materials) £000	Number of Persons Employed	Average Number of Persons Employed per Establishment
Woollen Section					
1. Manufacture of recovered wool ..	50	1,606	388	1,816	36
2. Woollen spinning only.	67	3,926	1,252	5,871	78
Woollen weaving, whether combined with spinning or not :—					
3. Blankets, shawls, and coverlets	50	2,364	891	6,182	124
4. Flannels and delaines	25	705	302	2,423	97
5. Other woollen fabrics	385	23,586	11,080	64,788	168
6. Other woollen goods..	19	957	474	1,903	100
TOTAL : Woollen Section	596	33,144	14,387	82,983	139
Worsted Section					
7. Topmaking combers[1]	11	2,833	508	1,355	123
8. Commission combing	51	3,039	2,289	8,740	171
9. Worsted spinning only	264	31,201	9,229	59,958	227
10. Worsted spinning and weaving	96	13,769	4,736	30,270	315
11. Worsted weaving only	195	13,602	3,973	19,762	101
TOTAL : Worsted Section	617	64,444	20,735	120,085	195
Other Groups					
12. Wool merchants[1] ..	63	19,238	1,780	2,445	39
13. Commission work (except combing and other output) ..	144	1,571	1,042	7,148	43
TOTAL : All Sections	1,420	118,397	37,944	212,661	150

[1] Topmakers who gave out wool to be combed on commission are included in Group 12. The topmakers in Group 7 include only firms that purchased wool and made tops for sale but did not spin or weave.

Source: Census of Production

A rough division between the woollen and worsted sections of the industry shows that in terms of employment the worsted section is the larger, employing in 1935 about 120,000 workers, compared with 83,000 in the woollen section

(excluding carpets and rugs). There are a further 10,000 in firms of wool merchants or undertaking work on commission for both sides of the industry.

The work done on the worsted side includes the manufacture of tops and yarns for export and of hosiery yarns for the hosiery trade. Thus although there were more workers employed than in the woollen section, the output of woollen cloth was actually higher in 1935 than the output of worsted cloth, the figures being about 275 million sq. yds. for woollen fabrics, including flannels and blankets, and 175 million sq. yds. for worsted fabrics of all kinds.

The largest single section of the industry is composed of firms engaged exclusively in worsted spinning. In 1935 there were 264 establishments, employing 60,000 workers and producing a net output (i.e. value added to raw materials) equal to about a quarter of the total for the industry. A further 50,000 workers were employed by firms engaged solely in worsted weaving or combining worsted spinning and weaving. The remaining 10,000 workers on the worsted side were employed by topmakers and commission combers.

On the woollen side, the vast majority of the workers were in integrated firms combining all processes of woollen cloth manufacture. There were, however, 6,000 workers in 67 establishments confining themselves to woollen spinning, and about 2,000 workers in 50 small shoddy and mungo manufacturing establishments.

The firms employing the largest number of operatives were those combining worsted spinning and weaving, followed by the group confining themselves to the spinning of worsted yarns. The average number of persons employed per establishment by the first group was 315 and by the second 227. The firms on the worsted side of the industry were larger than those on the woollen side, and taking the industry as a whole, the average number of persons employed per establishment was 150.

The smallest firms were those making shoddy and mungo, some of those working on commission (e.g. carbonising or winding and warping) and those performing merchanting rather than manufacturing functions. There were, for example, 63 wool merchants, or rather topmakers, who did not themselves own combing plant but bought wool, gave it out to be combed on commission and sold the tops. It will be seen that although their total turnover amounted to £19 million, the net receipts of these businesses for work done was under £2 million.

Table 5 does not include firms engaged in dyeing and finishing on commission unless these firms also spin or weave. Thus it does not give a completely comprehensive picture of the industry since a large proportion of the dyeing and finishing, particularly of worsted yarns and cloths, is undertaken by specialist firms.

The topmakers included in Table 5 are those employing more than 10 persons who manufactured tops (" topmaking combers ") or bought wool and had it combed on commission (" wool merchants "). But since the table is intended to relate to manufacturing rather than merchanting functions, it does not give a comprehensive picture of the total number of merchants attached to the industry.

A fuller analysis, covering wool waste and rag merchants, topmakers, and manufacturers and spinners without plant, but not yarn and cloth merchants, is given in Table 5A. The firms included are those coming under the Woo Control during the war.

Both the country wool merchants and the wool waste and rag merchants may emloy sorters and graders as the topmakers normally do. Some of the wool waste and rag merchant only employ a warehouseman or two ; out of the 395 merchants, 253 emloyed less than 5 persons and only 21 more than 20 persons. Other manufacturers in this category use machinery (willeys) and there are, of course, manufacturers of shoddy who also act as rag merchants. The topmakers are on the whole larger firms and need much more capital since their turnover may exceed £1 million. The manufacturers and spinnners without plant may design cloths, finance the processing and take responsibility for the sale of the ultimate product; all but 15 of them employ less than 5 persons.

TABLE 5A

MERCHANTS IN THE WOOL TEXTILE INDUSTRY, FEBRUARY 1945

Number of establishments employing	Country Wool Merchants	Wool Waste and Rag Merchants	Topmakers	Manufacturers and Spinners without Plant	Total
1–10	102	332	47	43	524
10 and over ..	25	63	49	5	142
TOTAL ..	127	395	96	48	666
TOTAL personnel	975	2,272	1,350	242	4,839

Source : Wool Control

HORIZONTAL AND VERTICAL ORGANISATION

THE difference in structure between the woollen and worsted sections of the industry is not the invariable rule, since some of the largest firms on the worsted side are organised on a vertical basis, while there are also firms that confine themselves to the manufacture of woollen yarns without undertaking weaving. Moreover, even where firms are organised vertically, this frequently means little more than that separate departments are combined under a single ownership but are allowed considerable latitude in disposing of their product or buying their material. In a vertically organised worsted firm it is normal for the spinning side of the business to sell yarns to other firms, and for the weaving side to buy a proportion of its requirements of yarn from other firms. There is at least one firm that combs on commission, buys tops, buys and sells yarns, weaves, and has cloth woven on commission.

The existing structure has changed considerably in the last 100 years. Both sides of the industry were formerly organised on a vertical basis, and although woolcombing was undertaken by specialist firms at a much earlier stage it was only towards the end of the last century that the separation of spinning from weaving on the worsted side reached its present scale. There have been times since when there was a movement towards closer integration of processes and a subsequent change back again towards disintegration. Other countries have had a similar experience. In America, for example, there is at present a tendency towards vertical integration between spinning and weaving in the worsted trade and towards disintegration between the manufacture of tops and yarns.

The economies of a horizontal organisation on the worsted side arise partly

because of the greater latitude which it affords to the manufacturer, of selecting special qualities of yarn or cloth. It is not necessary for him to maintain a precise balance between his combing, spinning and weaving capacities, as he would in a completely vertical concern. A spinner is enabled to combine orders from different manufacturers and to spin on machinery specialised to a narrow range of counts and qualities instead of having to make small lots to meet the requirements of a single weaving shed.

The development of a large export trade in worsted yarns towards the end of the 19th century and the growth of the domestic market for hosiery yarns combined to give a further impulse to the separation of worsted spinning from weaving, since these changes meant a large alteration in the balance between spindles and looms and widened the market opportunities of firms concentrating on spinning.

The major reason for the contrast between the two sections of the industry appears to lie, however, in the greater flexibility of the machinery on the woollen side. It has been said that a woollen mill can spin anything with two ends to it; and the manufacturer of woollen cloth can, therefore, adapt his spinning plant to his yarn requirements comparatively easily. A worsted spinner, however, finds considerable economy in concentrating on a narrow range of counts and qualities, and could not change easily from the spinning of one material to another. This applies equally to combing, where the same machinery can be used to process all merinos without major changes, but cannot be adapted to process crossbreds without great expense and delay. A weaver on the worsted side may handle anything from fine silk to thick jute; to spin or comb even a part of that range of material would involve the use of several sets of machinery, which no one spinner or comber could keep running, or forcing the material through existing machinery at the expense of quality of the product and efficiency of operation.

The existing structure of the industry is also affected by the general stress on the quality of the product. Whereas on the worsted side the need to maintain a high quality of yarn tends to impose limits on the range of work that a spinner can profitably engage in, on the woollen side the blending of materials, the wide range of qualities of yarn, and the difficulty of ensuring that they will reach a fixed standard, make for control by a single management throughout. At the finishing end the same applies. So much depends upon the colour and finish of woollen cloth that the manufacturer is reluctant to risk having the work done on commission. On the worsted side, apart from the high class Huddersfield type cloths few manufacturers do their own dyeing and finishing because of the wide variety in types of cloth produced and treatment required.

Although the outstanding difference in structure is between the woollen and worsted sections of the industry, it would be a gross over-simplification to assume that this is the only difference of importance. Integration in the industry assumes a wide variety of forms, and there are firms that illustrate almost any possible combination of processes. Similarly any one process is carried on by firms of widely different types. In combing, for example, about one-third of the output of tops is produced by spinner-combers, and the remainder is divided in the ratio of approximately 2 : 1 between commission combers and topmaking combers.

In Tables 6 and 7 an attempt is made to show the main patterns of integration. The tables omit dyeing and finishing, as well as carbonising and the various

merchanting functions. They do, however, bring out the preponderance of firms engaged on a single process, and illustrate the most striking exception to this—the normal association of wool spinning with weaving in a single firm.

TABLE 6

INTEGRATION IN THE WOOL TEXTILE INDUSTRY, MAY 1946

Firms Engaged in	1 Process	2 Processes	3 Processes	4 Processes	Total
Combing[1]	55	25	14	3	97
Worsted spinning	184	68	25	3	280
Woollen spinning	79	332	17	3	431
Weaving	331	355	19	3	708
TOTAL ..	649	390	25	3	1,067

[1] Branches of Woolcombers Ltd. are counted as separate firms, as each makes a separate return.

Source : Wool Control

TABLE 7

TYPES OF INTEGRATION IN THE WOOL TEXTILE INDUSTRY, MAY 1946

Combers and worsted spinners	25
Combers, worsted and woollen spinners	6
Combers, worsted spinners and weavers	8
Combers, worsted and woollen spinners and weavers	3
Worsted spinners and weavers	33
Worsted and woollen spinners	10
Worsted and woollen spinners and weavers	11
Woollen spinners and weavers	322
TOTAL Number of Mixed Firms	418

Source : Wool Control

THE PREDOMINANCE OF SMALL FIRMS

IN some sections of the industry, notably commission combing and dyeing and finishing, large firms control a high proportion of total output. The two largest commission combers, for example, produce about a quarter of the total output of tops. In 1935, which may be taken as a fairly normal year, there were 19 establishments employing over 1,000 workers, and as some establishments with fewer workers were branches of large firms, the number of firms with more than 1,000 workers was presumably rather greater. About 100 firms employed over 500 workers; these firms employed 46 per cent of the workers in the industry and accounted for nearly half the total output.

At the opposite extreme were a large number of small firms, many of them one-man businesses, employing not more than 10 persons. These firms, which were not required to make returns of output to the Census of Production office, numbered 800 in 1935 and employed about 4,000 persons. Their output, however, was relatively insignificant and was estimated to be not more than 2 per cent of the total for the industry.

Between the very small and very large units come the mass of factories in the industry, employing between 10 and 500 workers. The normal establishment tends to fall within these limits and even when, as in woolcombing, a few large

TABLE 8

WOOL TEXTILE INDUSTRY

SIZE OF ESTABLISHMENTS IN 1935

(including manufacture of Carpets and Rugs)

Size (Average Number Employed)	Number of Establishments	Net Output (£000)	Number of Persons employed	Net Output per person employed 1935 (£)
11— 24 ..	196	810	3,558	228
25— 49 ..	263	1,837	9,392	196
50— 99 ..	356	5,144	25,518	202
100— 199 ..	351	9,029	51,604	175
200— 299 ..	168	7,730	41,497	186
300— 399 ..	75	4,236	25,651	165
400— 499 ..	26	1,677	11,445	147
500— 749 ..	40	3,932	23,397	168
750— 999 ..	24	3,457	20,324	170
1,000—1,499 ..	11	2,330	13,605	171
1,500 and over ..	8	3,367	16,218	208
Total ..	1,518	43,549	242,209	180

Source : Census of Production

firms produce most of the output, they may do so in a number of works, each with only a few hundred workers. The size-distribution of establishments in 1935 is shown in Table 8, and it will be seen that of the total of 242,209 workers employed, two-thirds were in 1435 factories employing less than 500 workers, and the remaining third in 83 factories employing over 500 workers. Nearly half the factories were in the range between 50 and 200 workers, and nearly half the workers in the range between 50 and 300.

TABLE 9

SIZE OF ESTABLISHMENTS IN YORKSHIRE, LANCASHIRE AND THE MIDLANDS, MAY 1946.

No. of Spindles	No. of Firms	Per cent. of Total No. of Firms	No. of Worsted Spindles (000's)	Per cent. of Total Worsted Spindles
(a) *Worsted Spinning*				
Under 2,000	13	6.0	17	0.7
2,000 and under 5,000 ..	56	25.7	202	8.1
5,000 and under 10,000	73	33.4	515	20.9
10,000 and under 20,000	50	23.0	820	33.1
20,000 and under 50,000	24	11.0	748	30.2
50,000 and upwards ..	2	0.9	172	7.0
	218	100.0	2,474	100.0

Worsted Spinning : covers firms with combs and woollen spindles as well as worsted spindles ; but does not include spinner-manufacturers.

No. of Looms	No. of Firms	Per cent of Total No. of Firms	No. of Looms	Per Cent of Total Looms
(b) *Weaving*				
Under 20	29	10.2	604	3.0
20 and under 50 ..	95	33.6	3,203	15.9
50 and under 100 ..	96	33.9	6,216	30.8
100 and under 150 ..	40	14.2	4,793	23.7
150 and under 300 ..	18	6.3	3,446	17.1
300 and upwards ..	5	1.8	1,923	9.5
	283	100.0	20.185	[a]100.0

Weaving: covers firms with weaving only; spinner-manufacturers not included.
Compiled from machinery activity returns rendered to wool control, which in some cases cover more than one mill and also cover branch mills in other areas.

Source: Wool Control

A special analysis of firms engaged in spinning and weaving in Yorkshire, Lancashire, and the Midlands, gives similar results. A fuller analysis for worsted spinning, provided by the Worsted Spinners' Federation is given in Table 55 (Appendix VII.).

The average number of worsted spindles in an establishment engaged in worsted or worsted and woollen spinning only is 11,350, and half of the spindles are in establishments with between 5,000 and 20,000 spindles. Similarly, in establishments engaged exclusively in weaving the average number of looms is only 71, and half of the looms are in establishments with between 50 and 150 looms.

The integrated firms carrying out more than one process tend to be rather larger than those that confine themselves to a single process. In Yorkshire, Lancashire, and the Midlands, firms engaged only in weaving had, on the average, 71 looms; firms combining worsted spinning and weaving had, on the average, 218 looms; firms combining woollen spinning and weaving had 106 looms; and firms in worsted and woollen spinning and weaving had 136 looms. On the other hand, firms undertaking all three processes had a much smaller number of worsted spindles and woollen carding sets than the average. The indications are, therefore, that the largest firms are those carrying on two processes only.

COMPETITION AND SPECIALISATION

THE existence of so many small firms means that there is as a rule intense competition and that few firms have much control over the price of their product. For example, we were told that a difference of 1s. 6d. on the price of a piece (i.e. 60–70 yards of cloth) was generally sufficient to obtain a contract.

The severity of competition tends to be limited in two ways. First of all, firms engaged in the production of cloth on a scale approaching mass-production have shown an increasing tendency to enter into long-term arrangements for the marketing of their cloth with some of the larger makers-up, multiple clothiers and retailers. While such firms rarely carry on the work on a commission basis, there is some shift of market risks to the buyer, who acquires an increased power to nominate the types of cloth which he wishes to have woven

for him, and even the types of yarn to be used in the cloths. This tendency is naturally confined exclusively to home market sales, and does not at present affect more than a comparatively small proportion of the total. It tends to increase the dependence of the manufacturer on a single large customer and limits his risks only within the period of the contract which he accepts.

The second and much more important way in which firms have come to adapt themselves to intense market competition is by the production of special lines. Between the wars, firms were forced by market conditions to extend the range of their products and to introduce new styles. The average firm, faced with high market risks due to changes of fashion and of demand, did not lay out its plant for a narrow range of products similar to those made by numerous other firms, but preferred as a rule, to try to build up a reputation for quality in its own special lines both in home and export markets. From the point of view of preserving elasticity of adjustment to changing market conditions, and maintaining the wide variety and high quality of exports, this is a development that is natural and desirable. It does, however, involve a larger burden of managerial effort in relation to turnover.

By way of illustration of this specialisation within the industry, the dyeing trade may be quoted. There are four sections of the trade: the loose wool section which dyes the raw material for woollen yarns; the slubbing and yarn dyeing section which dyes the raw material for worsted yarns and also yarns for all purposes; the piece "dyeing only" section which dyes pieces for manufacturers with their own finishing plants and works mainly on woollen pieces of medium to higher qualities; and the piece dyeing and finishing section which is largely engaged on worsted materials for men's and women's wear. Firms normally confine themselves to a single section of the trade and there is not a single firm that operates in all sections. Some sections are still further split up. There are low woollen piece dyers and finishers, dress goods piece dyers and finishers, coatings (suitings) dyers and finishers and even individual firms who are recognised as specialists in smaller categories of goods such as tropical suitings and bright goods (mohairs, alpacas, etc.).

The result of the growth of speciality products is a limitation of competition in most lines to a comparatively small number of firms. Although there are over 1,000 firms in the industry, the range of products covered is enormous; several hundred types of cloth are manufactured and even these require further sub-division according to style, pattern and finish. The extraordinary variety of products makes comparison between one firm and another very difficult; and even when two firms produce similar products, the methods by which they achieve their results may have surprisingly little in common.

THE IMPORTANCE OF PRIVATE FIRMS

THE smallness of the average firm is coupled with the comparative absence of the joint stock form of organisation from the industry. We have had no information from which to estimate the proportion of work carried on by different types of firm; but, there can be no doubt that, apart from the commission processes (combing, dyeing and finishing), and a few special lines such as hand knitting yarns, a large proportion of the work is carried on by small private firms and private limited companies. The proprietors of these firms have generally been brought up in the business, and are often second or third

generation owners. The industry, however, has always regarded new blood as valuable in itself, and as it is possible to make a beginning with a comparatively small amount of capital there have always been some successful firms built up during the lifetime of their founders.

At the end of the first world war the industry escaped the financial boom that led to the disastrous re-capitalisation of the cotton industry and, although there was some further movement towards the formation of joint stock companies, it was not on a large scale and did not seriously disturb the existing pattern of ownership and organisation. Nevertheless the general trend towards increased use of the joint stock system of organisation has continued throughout this century. In the past year there has been a further movement, due mainly to surtax and Death Duties, for private firms and companies to be refloated as public companies.

THE CONSTITUENTS OF TOTAL COST

IN order to provide some measure of the relative importance of different items in the total cost of cloth, and of the garments into which cloth is made up, the trade associations and the Ministry of Supply Costing Department were invited to submit figures for sample cloths and garments. These are given in Appendix VI together with a table (Table 43) showing the average value of raw material, intermediate products, and cloth on both sides of the industry in 1937.

The latter table shows that worsted cloth was, on the average, about 50 per cent more expensive than woollen cloth, and that worsted yarns in 1937 were 80 per cent more expensive than woollen yarns. This table also indicates that in 1937 about one-third of the value of worsted cloth represented the cost of the raw wool used. In view of the mixture of fibres on the woollen side, it is not possible to give an exactly comparable proportion.

In wartime, the cost of raw material formed a higher proportion of total cost. Table 44 in Appendix VI shows that raw material (mostly raw wool) formed about 40 per cent of the total cost of worsted cloth; Tables 46 and 52 indicate a still higher proportion for all raw materials in the case of woollen products.

In relation to the final cost of clothing, the cost of raw wool is rarely more than about 10 per cent. It will be seen from Tables 49 and 50 in Appendix VI, however, that it forms up to about 20 per cent of the cost of men's socks, and nearly 40 per cent of the retail price of blankets.

As suitings are the largest single product of the industry Table 47 is especially interesting. This indicates that raw wool forms 10 per cent of the selling price of worsted utility suits; wool combing and sorting 3 per cent; worsted spinning 4 per cent; weaving 6 per cent; dyeing and finishing 3 per cent. This accounts in all for 26 per cent of the selling price; the remaining 74 per cent goes to meet the cost of making up, marketing and distribution.

It is obvious from this that spinning and weaving costs form only a small proportion of the price of a cheap suit, and a still smaller proportion of the price of an expensive one. In the case of blankets and socks, the proportion of the retail selling price that reaches the wool textile industry is a larger one: 62 per cent for blankets and 34 per cent for socks. When allowance is made, however, for the cost of the raw material, the industry retains only 23.5 per cent of the price of a blanket, and 14.3 per cent of the selling price of socks. In the case of utility suits, the proportion retained is 13 per cent.

Taking the industry as a whole, of the net value added to raw materials, about half represents wage costs and half other costs. In 1935, which may be taken as a fairly representative pre-war year, the costs of the industry (including carpet and rug manufacture) were divided roughly as follows :—

	£ Million	Per Cent
Wages	21.5	23.0
Salaries and overheads (including profits)	22.0	23.5
Net value added to raw materials, etc. ..	43.5	46.5
Raw wool (about)	30.8	32.8
Woollen rags	2.1	2.2
Tops (imported or bought outside the industry)	1.5	1.6
Cotton and cotton yarns	2.7	2.9
Silk and artificial silk yarn	0.5	0.5
Coal, coke, fuel oil and purchased electricity[1]	1.9	2.0
All other charges, purchased materials and fuel	8.7	9.3
Payments for services rendered (e.g., dyeing and finishing)	2.1	2.2
Value of goods produced (about) ..	93.8	100.0

[1] The value of electricity generated in the wool textile mills where it is used is included under " Salaries and Overheads " and was about £450,000 in 1935.

A fuller analysis of conversion costs in woollen and worsted manufacturing is given in Table 51, Wages and Salaries in 1942 formed about two-thirds of the total, the remainder consisting of fuel and power, rent, transport, repairs, commissions, and a number of miscellaneous consumable items and standing charges.

The distribution of total costs between the main processes in the industry can be gathered from Tables 44, 46 and 52 and 53. On the woollen side, the cost of raw materials is generally about 60 per cent of the total, finishing costs are about 8 per cent, and spinning and weaving costs about 16 per cent each. These proportions vary widely with the type of cloth. This is equally true on the worsted side where on the average up to 40 per cent goes on raw material, and weaving is the next largest item, with spinning, combing and dyeing and finishing following in that order.

CHAPTER III. THE DEMAND FOR THE INDUSTRY'S PRODUCTS

WOOL has many advantages over other textile fibres. It is extremely strong and yet elastic; it is resistant to fire, and it can absorb a great deal of moisture without becoming damp or clammy. Because of its curl, or crimp, a large proportion of air space is included in the fabric into which it is woven, and as air is a bad conductor of heat, woollen clothes are very successful in preserving warmth. This characteristic is reinforced by the thickness of woollen clothing in relation to its weight.

The chief use of wool is in the manufacture of apparel for outer-wear. Its advantages for this purpose are not confined to those just described. In the purchase of outer-wear people are particularly sensitive to colour, design and

finish and are inclined to use clothes as an instrument for the display or accentuation of personality. Now wool is particularly well suited for purposes of display. As Sir Thomas Barlow put it to us, the manufacturer need only bring out the inherent qualities of this wonderful material with the minimum of interference. He added that in the printing of textile fabrics, it is possible to get extreme brightness and brilliance of effect on wool in a way that is not possible with any other fibre.

There is comparatively little information on the proportions in which wool is used for various types of apparel and other products The range of uses is a very wide one and extends from clothing of all kinds to furnishing fabrics, including curtains and chair covers, blankets, carpets and rugs, and mechanical cloths, including book cloths, billiard table cloths and press cloths for industrial purposes. It is also used by the hosiery industry for the manufacture of socks, underwear and other knitted garments. In addition to finished cloth, there are various intermediate products of the industry, such as yarns, tops and noils, which are exported in large quantities from this country.

It is not possible from the available statistics to distinguish the relative size of these various uses for wool. Information is given in Table 59, Appendix VII, however, to show the distribution of utility cloth in the year May, 1943–April, 1944 between the main types of garments ; and a further table has been added giving the distribution of the output of cloth between different products in the United States. The figures show that just over half the output was used in Britain in making garments for men, youths and boys, the remaining half going into garments for women, girls and infants In America, the output of woollen garments for women and children's wear has increased enormously over the past few years and is now larger than the output of men's wear.

Although the American figures, which are available in great detail, are not necessarily typical of British conditions, it is believed that they do not differ widely in the ratios which they give for woollen and worsted garments of various types. In the first quarter of 1946 the proportions were as follows :—

TABLE 10

PROPORTION OF WOOLLEN AND WORSTED FABRICS IN THE UNITED STATES

(Based on linear yardage)

	Proportion of Worsted	Proportion of Woollen
Men's wear, total	55	45
Suiting and panting	65	35
Shirting	8	92
Overcoating and top-coating	10	90
Women's and children's wear, total ..	20	80
General use fabric [1]	25	75
All other apparel fabric	80	20
Apparel fabrics, total	37	63

[1] Including melton, mackinaw, snow and ski suit cloth, lining and interlining and bathrobe flannel.

Source: Facts for Industry ; Wool Manufactures (U.S. Dept. of Commerce)

The American figures also suggest that the competition between wool and other textile fibres is often, in effect, competition between different types of garment rather than between garments of the same type woven of different material. Nearly all the main garments are made either almost exclusively of wool or almost exclusively of other fibres. The garments made almost exclusively of wool were men's suits, trousers, overcoats and topcoats; women's suits, ensembles, coats and skirts; and children's suits and coats. In all of these, except children's suits, the proportion of woollen garments was over 80 per cent. On the other hand, in ladies' dresses the proportion made of wool was only 5 per cent.

In Britain, the products of the worsted side of the industry are used largely in men's suits, ladies' dress and costume cloths, waterproofings and hosiery yarns for knit-wear. At one time there was a large trade in linings, but in the last 40 years this has steadily diminished, owing to the competition of rayon. Worsted yarns, particularly of mohair and alpaca, are also used extensively in furnishing fabrics.

On the woollen side of the industry, the main products are used for tweed suits, flannel trousers, overcoats, blankets and various mechanical cloths. Woollen cloths are also used extensively in ladies' wear, since there is much greater scope for variety of structure and colour.

THE IMPORTANCE OF INTERMEDIATE PRODUCTS AND BY-PRODUCTS

IN addition to finished products, the British wool textile industry also produces, either for export or for sale outside the industry, some important intermediate products and by-products, including yarns, tops, noils, shoddy and waste. Other by-products are obtained through the recovery of wool fats; for example lanolin and wool grease. These by-products are used in the production of pharmaceuticals, cosmetics, cutting oils, printing inks, lubricating greases, rust preventatives, varnishes, etc.

The relative importance of the main intermediate products and by-products may be judged from the fact that in pre-war years they made up nearly half the total exports of woollen and worsted goods of all kinds. In 1935, a fairly typical year, exports of tops and yarns were valued at £11.3 million, exports of waste, noils and unrecovered wool at £2.6 million, and exports of tissues, including blankets, rugs and miscellaneous items, came to £17.3 million. A comparison between the figures for 1935 and those for 1912 shows that the proportion of exports consisting of semi-finished goods has been increasing; in 1912 it was 38 per cent and in 1935 it had risen to 44 per cent. Owing to abnormally low exports of yarn, the proportion is now somewhat less, but in the first half of 1946 it was still 30 per cent. These proportions, however, somewhat exaggerate the relative importance of semi-finished products as a source of foreign exchange as a higher proportion of their value goes to meet the cost of imported wool.

Taking the total output rather than exports (Table 11), about 70 per cent of total production consists of finished goods, half the remainder of semi-finished products, and the other half of yarns sold for consumption in the hosiery and other industries.

TABLE 11

OUTPUT OF WOOLLEN AND WORSTED PRODUCTS IN THE U.K.

(including carpets and rugs)

Value of Output free from duplication

(£ million)

	1924	1930	1935
Exports of semi-finished products, tops, noils, waste and yarns, estimated value at mill	22.8	11.2	12.4
Woollen and worsted goods made, as finished	106.0	68.6	69.6
Sales of woollen and worsted yarns for consumption outside the trade	15.0	10.0	14.9
TOTAL value of woollen and worsted goods produced	143.8	89.8	96.9
Value of virgin wool used	—	—	30.8

Source: Census of Production

TABLE 12

EXPORT OF WOOLLEN AND WORSTED GOODS[1]

(£ million)

	1912	1935	1938	1946[2]
Waste	.65	1.09	1.05	1.02
Noils	1.22[3]	1.21	.96	.27
Recovered wool[4]	.39	.27	.17	.37
TOTAL ..	2.26	2.57	2.18	1.66
Tops	3.48	4.80	3.11	4.59
Yarns :				
Woollen	.59	1.05	.68	.69
Worsted	5.31	4.31	3.54	4.48
Hair	1.93	.57	.57	.42
Unenumerated	.40	.56	.54	.22
TOTAL ..	8.23	6.49	5.33	5.81
Tissues :				
Woollen	14.10	10.24	9.32	15.73
Worsted	6.71	5.61	5.66	8.23
Miscellaneous	.39	.60	.55	1.23
TOTAL ..	21.10	16.45	15.53	25.19
Blankets	.52	.28	.38	2.34
Other[5]	.91	.57	.47	.70
GRAND TOTAL ..	36.50	31.16	27.00	40.29

[1] Exports to Eire are included in 1935, 1938 and 1946, but not in 1912.
[2] Annual rate, based on January–June, 1946.
[3] Including carbonised wool.
[4] Woollen and hair rags, pulled, shoddy or mungo.
[5] Including travelling rugs, wool felt and wool flocks.

Source: Trade and Navigation Accounts

TABLE 13

EXPORTS OF WOOLLEN AND WORSTED GOODS

(quantities)

	1912	1935	1938	1946[2]
Tops (million lbs.)	44.83	55.93	32.46	28.06
Yarns (million lbs.)				
Woollen	6.25	7.81	4.89	1.88
Worsted	56.78	33.08	22.91	11.49
Hair (mohair and alpaca)..	15.49	4.38	2.85	.92
Unenumerated	9.39	5.39	4.03	.77
TOTAL ..	87.91	50.66	34.68	15.06
Tissues (million sq. yds.)[1]				
Woollen	145	71.21	58.91	51.14
Worsted	90	38.46	31.58	22.36
Miscellaneous	5	7.32	5.34	4.22
TOTAL ..	240	116.99	95.82	77.72
Blankets (thousand cwts)	72.4	26.8	30.9	115.7

[1] The figures for 1912 were returned in linear yards; those given above are estimates submitted by Mr. C. F. Mallett.

[2] Annual rate, based on January–June, 1946.

Source: Trade and Navigation Accounts

OUTPUT AND EXPORTS

(a) *Subsidiary Products and By-products*

THE wool industry earns foreign exchange not only by direct exports of manufacturers but also by trade in raw materials. There is a valuable export trade in British wool, chiefly of carpet qualities. The entrepôt trade in foreign and colonial wool also brings in a large amount of foreign exchange; sometimes the re-exports are of greasy wool and sometimes of imported wool that has been scoured or carbonised in the United Kingdom. There are large exports of rags, shoddy and waste, the latter alone totalling over £1 million per annum. Of the output of noils, the proportion exported is and has been for the past forty years, over 40 per cent.

(b) *Tops*

Of the total output of tops, about one-seventh is normally exported. This proportion is naturally subject to some variation, but has remained relatively stable over the past forty years, except in war-time. Apart from sales of broken tops to the woollen trade, the remaining six-sevenths of the output of tops formed the raw material for the manufacture of worsted yarns; imports of tops from abroad have always been trifling.

The chief markets for tops were formerly on the Continent, and before the first World War, practically the entire output went to European destinations, Canada and Japan. The largest single market was Germany, which took over a third of the total exports. In the years before the second World War, the volume of exports was about the same as in the years 1909–13, but the share taken by Western Europe has fallen from 76 per cent to 35 per cent. Exports were more widely dispersed and went increasingly to countries where the wool

textile industry had not yet become established. Canada was much the largest market and Germany, Finland, and China also took a large proportion.

There was a tendency in pre-war years for the proportion of merino tops in total export of tops to increase. In 1925 (the first year for which figures are available) about one-sixth of the exports were merino and in 1938 over one-third.

(c) *Yarns*

There is a marked difference of orientation between spinners of woollen and worsted yarns. As will be seen from Table 14, exports of woollen yarns form only a small proportion of total production (about 2½ per cent). Exports of worsted yarns are a much larger fraction of total output (about 15 per cent). In addition, a considerable proportion of worsted yarn is bought by the hosiery trade. In 1935, of the total consumption of worsted yarns, 94 million lbs. were used by weavers of worsted cloth, 60 million lbs. were sold to the hosiery trade, 33 million lbs. were exported and probably about 20 million lbs. were sold in the home trade as hand-knitting yarns. Thus, less than half the total consumption of worsted yarn was in weaving, while nearly all the woollen yarn produced was subsequently woven within the industry.

TABLE 14

CONSUMPTION OF WOOLLEN AND WORSTED YARN IN 1935

(000 *lbs.*)

Trade	Woollen Yarn		Worsted Yarn
Woollen and Worsted :			
Used in spinners own works (for weaving, etc.)	231,645		27,863
Purchased	44,105		66,435
TOTAL	275,750		94,298
		370,048	
Cotton weaving		1,306	
Silk and artificial silk		729	
Hosiery		60,630	
Elastic webbing		32	
Lace		88	
TOTAL : Woollen and worsted yarn used [1]		432,833	
Woollen and Worsted Yarn :			
Total production	298,569		227,472
Exports	7,814		33,082
Retained imports	252		1,038
	291,007		195,428
Available for consumption in U.K.		486,435	

[1]Excluding hand-knitting yarns ; the output of these yarns produced by worsted spinners in their last pre-war financial year was 27 million lbs.

Source: Census of Production

There has been a general tendency for the export trade in yarns to decline, and a compensating tendency for sales of hosiery yarns to increase. Exports in 1907 formed 18.5 per cent of total production, and in 1937 only 7.3 per cent. It is not possible to provide reliable figures of the trend in the consumption of

hosiery yarns, but it is probable that there has been an increase from less than 40 million lbs. in 1907 to 60 million lbs. in 1935.[1]

The decline in exports of yarns has been mainly due to the reduction in exports to Germany. In the years 1909–1913, Germany took 55 million lbs. out of a total of 87 million lbs.; in the years 1936–1938, she took 8 million lbs. out of 41 million lbs. Omitting Germany and Eire, the decrease in exports was relatively small—from 32 million lbs. to 28 million lbs. As with exports of tops, there was an increasing dispersal of exports by destination, and a greater dependence on non-European markets.

FINISHED PRODUCTS

THE course of demand for woollen and worsted tissues over the past 40 years can be seen from Table 15.

TABLE 15

PRODUCTION, CONSUMPTION AND EXPORTS OF WOVEN TISSUES[1]

(Million *sq. yds.*)

	Production	Export	Retained Imports	Home Consumption	Proportion Exported	Share of Home Market Supplied by British Products
1907[2]	(529.6)	(245.2)	(89.3)	(373.7)	46.3	76.2
1912[2]	(572.5)	(230.3)	(77.3)	(419.6)	40.3	81.6
1924	440.0	221.6	27.1	245.6	50.4	89.0
1930	324.1	115.5	35.2	243.8	35.6	85.6
1935	412.9	111.3	3.9	305.5	27.0	98.7
1937	445.5	124.5	7.7	328.7	27.9	97.7

[1] Excluding damasks and plushes, flannels and delaines.

[2] The figures for 1907 and 1912 were returned in terms of linear yards and have been converted to square yards by adding ⅛.

Source: Census of Production and Wool Control.

TABLE 16

PRODUCTION, CONSUMPTION AND EXPORTS OF FLANNELS AND DELAINES

(*million sq. yds.*)

	Production	Exports	Retained Imports	Home Consumption
1907*	(75.9)	(13.0)	(—)	(62.9)
1912*	(67.8)	(11.4)	(—)	(56.4)
1924	25.9	7.8	—	18.2
1930	15.7	2.8	.1	13.0
1935	16.1	5.4	—	10.7
1937	19.9	4.4	—	15.5

* The figures for 1907 and 1912 were returned in terms of linear yards and have been converted to square yards by adding ⅛.

Source: Census of Production and Wool Control

[1] The value of hosiery yarns consumed in 1907 was £3.64 million; in 1935 it was £8.48 million. The rise in hosiery yarn prices between 1907 and 1935 was probably about 40 per cent.

TABLE 16A

PRODUCTION, CONSUMPTION AND EXPORT OF BLANKETS

(thousand pairs)

	Production	Exports	Retained Imports	Home Consumption
1907	3,130	793	—	—
1912	3,611	—	—	—
1924	3,017	2,146	80	951
1930	3,096	596	61	2,561
1935	3,650	417	10	3,243
1937	3,507	613	3	2,897

Source: Census of Production and Wool Control

Between 1907 and 1924 home market consumption fell by about 40 per cent; from 1930 onwards the demand increased, and in 1937 it had risen by over one third from its lower level. The reasons for the large reduction in demand between 1907 and 1924 are not altogether clear. It is probable, however, that it reflects the replacement of wool by rayon linings and the trend during and after the first World War towards lighter and shorter clothes both in men's and women's wear. The fall was even greater in the demand for flannels and delaines, because of changes in social customs and habits. Whatever the explanation of the changes over the past 40 years, they illustrate the violence with which fashions can change and the consequent difficulty of predicting future demand with any degree of confidence. The recent increase in consumption in the United States points the same moral.

In exports, the trend was a different one. In 1924 the volume of exports was about the same as in 1912, but by 1935 had dropped by 50 per cent. From the middle 20's onwards the industry was increasingly dependent on the home market and less and less on exports; in 1937 the proportion of export trade to home trade had fallen to 27 per cent. This may still seem a high proportion but it is, in fact, not much in excess of the average that will have to be reached over the whole field of British manufacturing industry if exports are to reach the target of 75 per cent above the pre-war level. Of British exports of tissues, woollen goods formed a high proportion and were roughly double the exports of worsted tissues.

Rather less than 50 per cent of the tissues exported in pre-war years went to Empire consumers, amongst whom Canada and South Africa were the most important. South American countries took about 13 per cent and the United States about 5 per cent. As a consumer of British woollen and worsted tissues, the United States was roughly equal to Eire, although in earlier years she was one of the largest British markets.

Of the changes in exports in pre-war years none was more striking than the wholesale loss of markets in the Far East. In 1928, China and Japan took 18 per cent of British exports of wool tissues—more even than Canada, the next largest British market. By 1937, the 18 per cent had fallen to 4 per cent and markets that once took nearly 18 million lbs. of tissues took no more than 2.5 million lbs. Almost the only markets in which the industry was able to extend its sales over those years were Denmark (which bought nearly four times as much), New Zealand (which bought twice as much) and South Africa (which became the third largest market, and has since become the largest).

The cloths exported were, in general, rather lighter and of better quality than those sold on the home market. The difference, as will be seen from Table 17, was not one of kind, but of degree, and the export trade was by no means dependent upon high class cloths and novelties.

TABLE 17

AVERAGE VALUE OF GOODS PRODUCED, EXPORTED AND IMPORTED IN 1935

	(*Shillings per Square Yard*) Production (*at factory*)	Exports (*f.o.b.*)
Woollen Tissues		
(a) *All Wool :*		
16 ozs. and over	4.75	4.86
12 ozs. under 16 ozs.	2.54	4.61
8 ozs. under 12 ozs.	2.33	3.54
Under 8 ozs.	1.74	2.02
(b) *Mixed :*		
16 ozs. and over	2.32	2.76
12 ozs. under 16 ozs.	1.77	2.94
8 ozs. under 12 ozs.	1.43	2.54
Under 8 ozs.	1.42	1.67
Worsted Tissues		
(a) *All Wool :*		
12 ozs. and over	4.26	4.82
Under 12 ozs.	2.89	3.36
(b) *Mixed :*		
12 ozs. and over	4.18	4.03
Under 12 ozs.	3.01	2.70
Woollen Tissues Average	2.00	2.88
Worsted Tissues (including linings, etc.), Average	2.92	2.95

Allowing for cost of transport from factory to port, the average value of worsted tissues made for export was actually lower in 1935 than the average value of all worsted tissues produced, and in woollen tissues the average difference was no more than a few pence per yard. The only range of cloths in which there was an appreciable difference in value between exports and sales in the home market was in medium weight woollen cloths and even in this category the average value of exports was no more than some 4s. per sq. yd. for pure wool cloths and 2s. 6d. per sq. yd. for cloths of wool and other fibres. The fact that there was no large difference in average value between cloth sold in the home and in foreign markets, suggests, although it would be difficult to demonstrate the point, that the export industry derived advantage from the high level of demand in Britain for good quality cloth.

THE FUTURE LEVEL OF DEMAND

(i) *Competition with Other Fibres*

ONE of the most important uncertainties in forecasting the future demand for the products of the industry is the competition which will have to be faced from other fibres.

For the past half century the world consumption of wool for clothing purposes has risen steadily, but at a diminishing pace (see Table 18). In the years 1929–33, it was nearly 25 per cent higher than in the years 1909–13 ; during the war it was about 30 per cent higher. The growth of consumption has been roughly equal for wool and cotton, and slightly more rapid than the growth of world population. In the last fifteen years, however, the use of rayon and

staple fibre has checked the expansion in demand for natural fibres. A comparison of the five year period 1929–33 with the five year period 1939–43 shows an expansion in the consumption of rayon and staple fibre for clothing purposes by over 2,000 million lbs. per year, while the consumption of apparel wool rose only by 100 million lbs. per year, and the consumption of clothing fibres as a whole by 3,300 million lbs. per year. Over the same period the share of wool in total consumption fell from 14.5 to 11.9 per cent, while the share of rayon and staple fibre increased from 3.5 to 14.0 per cent. Whereas in 1913 the share of artificial fibres was much smaller than that of natural silk, by 1943 it was well above that of wool.

It would be a mistake to draw too hasty a conclusion from these figures. The growing use of artificial fibres before and during the war owed much to the

TABLE 18[1]

WORLD PRODUCTION OF FOUR MAIN CLOTHING FIBRES AND WORLD POPULATION, 1890–1945

Five Year Averages (Except 1890 and 1945)	Cotton	Wool (Clean)	Silk	Rayon and Staple Fibres	Clothing Fibres Total	World Population Million Inhabitants
			I (million lb.)			
1890 ..	5,975	1,600	26	—	7,601	—
1909–13 ..	10,648	1,685	65(a)	20(b)	12,418	1,786(b)
1924–28 ..	12,452	1,860	112	240	14,664	1,925
1929–33 ..	12,364	2,089	126	526	15,105	2,025
1934–38 ..	14,186	2,075	122	1,438	17,821	2,112
1939–43 ..	13,552	2,192	99	2,581	18,424	2,170(c)
1945 ..	11,100	2,250	25	1,530	14,905	—
			II (Index : 1909–13 = 100)			
1890 ..	56	95	40	—	61	—
1909–13 ..	100	100	100(a)	100(b)	100	100(b)
1924–28 ..	117	111	170	1,200	118	108
1929–33 ..	116	124	194	2,630	121	113
1934–38 ..	133	123	188	7,193	143	118
1939–43 ..	128	130	174(c)	12,965	148	122(c)
1945 ..	104	133	38	7,650	120	—
			III (Clothing Fibres : Percentage Shares)			
1890 ..	78.6	21.1	0.3	—	100	—
1909–13 ..	85.6	13.6	0.5	0.2	100	—
1924–28 ..	85.0	12.7	0.7	1.6	100	—
1929–33 ..	81.1	14.5	0.9	3.5	100	—
1934–38 ..	79.4	11.6	0.9	8.1	100	—
1939–43 ..	73.6	11.9	0.5	14.0	100	—
1945 ..	74.5	15.1	0.1	10.3	100	—

(a) Average, 1911–15. (b) Average 1910–13. (c) 1939.

[1] The figures in this table show the output of the fibres named for all purposes, not for apparel, etc., only. A large proportion of the cotton and rayon produced is absorbed by industry; most of the increased output of staple fibre in the United States over the past few years, for example, has been used in the manufacture of yarn for tyres.

Sources: Rayon Organon; and Dr. Gerda Blau: "Wool in the World Economy"

efforts of Germany to reduce her dependence on imported natural fibres; in 1944 she was producing over 800 million lbs. per annum of rayon and staple fibre—about a quarter of the world total. In other countries, the increase in output reflected the success of a new material in driving natural fibres from some areas of demand, without implying equal success in the future over the rest of the field. Centuries ago, the same process of substitution came into play with the growth of the cotton industry, but the characteristic advantages of wool preserved a considerable, and, indeed, expanding market, in spite of the higher cost of wool in comparison with cotton. It would be reasonable to expect equal resilience in the face of competition from artificial fibres. But some further loss of markets for wool and cotton seems inevitable before the new fibres have been fully exploited.

A change in raw material would not necessarily reduce employment in the wool textile trade. Staple fibre, for example, can be spun on woollen or worsted spindles and the yarn woven on woollen or worsted looms. In weaving, the use of mixtures is an old-established practice and there would be no difficulty in using a higher proportion of artificial fibres on existing looms.

(ii) *Home Demand*

The trend between 1930 and 1937 was towards a rapid increase in demand; the output of British industry for the home market rose by 55 per cent over these seven years, and total home demand expanded by nearly a third. Even if this trend were arrested or reversed, for example by the increasing use of rayon and synthetic fibres, it is obvious that for some time there would be arrears to be made up by the average consumer in replenishing his wardrobe after six years or more of clothing rationing.

We do not anticipate, therefore, that the home market demand will eventually be less than it was before the war. We are inclined to set the increasing dependence on synthetic and artificial fibres against the arrears of war-time and the higher expenditure on clothing to be expected in conditions of full employment and greater purchasing power, and to conclude that an increase in home market demand of up to 10 per cent on the total in a good year such as 1937 is not unlikely. We should like to emphasise, however, that this is little better than a rough guess and that it is most important that a further study should be made of the probable changes in demand over the next five years.

(iii) *Exports*

It is not easy to form a balanced view of the opportunities open to the industry in foreign markets. It has always been true that exports of wool textile-manufactures varied closely with the total volume of international trade in these goods. Britain, before the war, was supplying 45 per cent of the world's exports of wool textiles and it would be exceedingly difficult to effect a large increase in this percentage. The future of British exports will be governed, therefore, much more by the total volume of trade than by any change in the share of trade enjoyed by British manufacturers.

The total volume of world trade in wool goods for well over half a century has been on the decline, and there are obvious tendencies making for a further decline. During the war many countries expanded their production of wool textiles, and they are unlikely to abandon the industry that they have built up now that it is possible to obtain supplies from elsewhere. In the five main wool producing countries, for example, the consumption of wool almost doubled

during the war although the increase in employment in wool textiles and in the yardage of cloth manufactured was more modest. In pre-war years these five countries took about 25 per cent of the total export of tissues from the United Kingdom.

TABLE 19

WOOL CONSUMPTION IN FIVE MAIN SURPLUS COUNTRIES

Country	Consumption 1934–8 Average	Consumption Latest Available Year	Percentage Increase Over 1934–38 Level
	Mn. lb. Actual Weight	Mn. lb. Actual Weight	
Australia	64	110	72
New Zealand	7	15	114
South Africa	—	8	—
Argentina	60	100	67
Uruguay	5	10	100
TOTAL ..	136	243	79

Source: International Wool Secretariat

On the other hand, there has been a simultaneous increase in the level of demand for woollen and worsted goods in many countries, notably the United States. This increase in demand obviously holds out prospects to exporting countries, provided they can make delivery within a reasonable time. The increase is likely to be of particular advantage to countries making quality products, since the demand for higher quality goods is likely to rise faster than the average. In addition, there are some important producers who, for the moment, are unable to offer effective competition. The most important of these, Germany and Japan, accounted before the war for about 30 per cent of the total volume of international trade in wool textile manufactures. Even if German and Japanese policies are controlled and the full blast of Japanese low wage competition heavily restricted, it is extremely unlikely that those two countries will continue indefinitely to neglect the opportunity of obtaining foreign exchange by resuming the export of wool tissues. Both countries remain heavily dependent upon exports to maintain their economy. But as their heavy industries will be restricted and controlled so that they can make no large contribution to exports, there will be every incentive to Germany and Japan to develop lighter industries in which textiles are certain to be included. The advantage derived, therefore, from their temporary incapacity is not likely to be a lasting one.

Of the other important manufacturers, both Italy and France are rapidly getting back into production; their plant and equipment suffered comparatively little damage during the war, and the level of activity in France is already higher relatively to pre-war years than it is in Britain.

An expansion in British exports of wool textile manufactures, therefore, hinges in the first place on an increase in the total level of world demand, and in the second place on our success in finding markets in the countries which are increasing their consumption of wool goods most rapidly. All things considered, it would be rash, particularly in view of the present difficulties experienced by the industry, to assume a volume of exports 5 years from now more than some 20 per cent higher than in a good pre-war year such as 1937.

This is not to say that the industry should not attempt to achieve a higher target. But when it is remembered that exports, even in the best years between the wars, never rose higher than in 1913, the conclusion seems irresistible that a 20 per cent expansion in the volume of exports would be no mean achievement. It would, in fact, represent a doubling of the level reached in the first half of 1946. This is rougly the proportion in which exports as a whole will require to expand in order to meet the target.

(iv) *Total Demand*

These conclusions refer to the trade in finished goods. Account must also be taken, however, of the demand for intermediate products. The demand for these has been better maintained in the past than the demand for finished goods because in the course of industrialisation most countries tend to start with the weaving of cloth and work backwards to yarns and tops. It may prove difficult, therefore, to increase exports of intermediate products without a simultaneous fall in exports of finished goods. We have assumed, however, that both show an expansion of 20 per cent. On this basis, taking pre-war exports at 30 per cent of total production, the level of demand which we postulate would be in total 10–15 per cent higher than in 1937.

TARIFFS AND THE FUTURE OF INTERNATIONAL TRADE

IN suggesting an increase in exports of 20 per cent, we are pre-supposing that conditions are favourable to an expansion in the general level of international trade. If tariff barriers remain high, or other limitations on imports are imposed, the industry will obviously be in no position to expand its exports. Tariff barriers are already very high, sometimes approaching 100 per cent *ad valorem*, and they have risen rapidly over the past thirty years: between 1912 and 1939 the average *ad valorem* duty payable abroad on a 16 oz. British cloth rose by 139 per cent without taking account of various surcharges and additional taxes. It will not be easy to secure a reversal of this upward trend.

We are assuming that at the forthcoming international trade discussions the Government will seek to secure such reductions and simplifications in trade barriers and such limitations on unfair trade practices as will enable the industry to compete fairly with foreign manufacturers. At the same time, we think it proper to draw attention to the fact that these barriers are much greater than those protecting the British industry. There is no reason, therefore, why that protection should be withdrawn in its entirety if the only result were to obtain a relatively small concession from other countries, when we think that it would be in the national interest to maintain some measure of protection.

CONCLUSIONS AND RECOMMENDATIONS

AFTER the period of re-stocking home demand for finished products may show an increase of up to 10 per cent over the total in a good year such as 1937, but a further study should be made of the probable changes of demand over the next five years. (*Page* 27.)

Though the industry should attempt a higher target a 20 per cent expansion of exports of finished products over 1937 would be no mean achievement. (*Page* 29.)

Taking into account intermediate products a level of demand 10–15 per cent higher in total than in 1937 may be postulated. (*Page* 29.)

The estimate for exports assumes that in forthcoming discussions the Government will seek to secure such reductions and simplifications in trade barriers and limitations on unfair practices as will enable the industry to compete on fair terms. Protection should not be withdrawn in its entirety if the only result were to obtain relatively small concessions, when it would be in the national interest to maintain some protection for the industry. (*Page* 29.)

PART II

Organisation and Production

Full Employment as the Common Objective

CHAPTER IV. RAW MATERIALS

WOOL is a living fibre, with all the variety of life. It differs in length, lustre, colour, fineness, tensile strength, crimp, style and handle. There are also wide variations in the content of extraneous matter, including soil, seeds, burrs, sweat, grease, and moisture. The weight of clean wool in relation to its weight in the fleece varies from as little as 25 per cent to 80 per cent. Moreover, the characteristics of wool are not constant from year to year, either by country, or by flock, or even by individual sheep; the breed of a sheep, the number of month's growth of the fleece, and the part of the sheep from which the wool is clipped, all affect the length and quality of the fibre.

The extraordinary variety of grades of wool, extending to upwards of 7,000, is of the utmost importance to the wool textile industry. It means, in the first place, that the industry starts with a raw material that lacks uniformity and that the standardisation of manufactured woollen products is correspondingly limited in comparison with artificial fibres such as rayon. The variety of raw material also puts a premium on the skill with which different fibres are selected and blended, and introduces an element of craft or artistry into the process of manufacture from the start. In addition, the large number of different grades complicates the marketing of the raw wool and has prevented the adoption of the techniques which have been developed in other commodity materials for stabilising prices. It is almost impossible, for example, to organise a futures' market. The adjustment of price to differences in quality has normally been left to the mechanism of the auction markets at which the price of particular grades can fluctuate widely even in relation to the general trend of wool prices.

It is important to emphasize both the need for flexibility and skill in the industry in making the most of a wide range of raw materials, and the unsettling effect of wide fluctuations in raw material costs, which form over 30 per cent of the total cost of cloth, varying according to the type of cloth and the cheapness or dearness of wool. It is obvious that greater technical efficiency in the organisation of production can be more than off-set by failure to make the best use of the material or by unnecessary expense in its procurement.

Virgin wool is not the sole raw material used by the industry. Other fibres of almost equal variety are used especially in the woollen section of the trade. Apart from fleece wool clipped from the sheep, and skin wool removed from the skin of slaughtered animals, use is also made of recovered wool (shoddy and mungo), noils and wastes; various types of animal hair, such as mohair and alpaca; and vegetable and artificial fibres such as cotton and rayon.

Of the materials used, fleece and skin wools are much the most important, and in pre-war years accounted for about five-sixths of the total weight of material spun into yarns. The remaining one-sixth consisted almost entirely of

recovered wool, including wool from imported sheepskins. Animal hairs were a declining fraction of the total; only about 10 million lbs., a little over 1 per cent of the total, were used in the years 1935–1938, compared with over 40 million lbs., or 5 per cent, thirty years previously. Recovered wool was also of diminishing importance; less than half the quantity that was used in the peak years was consumed by the industry before the war. The main changes in the raw materials consumed over the past century are shown in Table 20.

TABLE 20

ANNUAL CONSUMPTION OF WOOL AND HAIR IN THE UNITED KINGDOM[1]

(millions of lbs.)

	Foreign and Colonial Wool (Including Mohair, Alpaca, etc.)	Home Grown Wool	Pulled and Recovered Wool (Including Wool from Rags and Imported Sheepskins)	Total
1850–54 ..	82.0	123.0	36.0	241.0
1870–74 ..	191.2	150.4	112.0	453.6
1890–94 ..	342.8	129.8	150.2	622.8
1909–13 ..	506.2	94.8	244.9	845.9
1925–29 ..	473.0	62.0	110.7	645.8
1935–38 ..	607.5	67.0	112.5	787.0

[1] The weight of wool is included on a greasy basis; in terms of clean weight the relative proportions would show slightly different results.

Source: Bradford Chamber of Commerce

On the worsted side of the industry, the consumption of tops for civil purposes has recently been in the proportions given in Table 21. These proportions (like those in Table 22 for the woollen section) must not be taken as fully representative of normal usage, especially as the bulk of the civilian production has been for utility cloth with a smaller proportion than usual of high-class luxury fabrics.

TABLE 21

TOPS DRAWN FOR CIVIL PURPOSES

12 weeks ended 31st August, 1946

	Million lbs.	Per Cent
Merino	21.66	66.7
Crossbred	8.87	27.3
East Indian, etc.	—	—
Hair	1.30	4.0
Artificial silk	0.65	2.0
	32.48	100.0

Source: Wool Control

In the spinning of worsted yarns, merino tops are now much the most important material, with crossbred wool next, and hair and artificial silk playing a subordinate part. The proportion of tops made from hair was as high as 13 per cent in 1907, and at that date 32 per cent of the exports of worsted yarns were

of alpaca, mohair, etc. By 1935 these proportions had fallen to 5 per cent and 13 per cent respectively, and there is nothing to suggest that these proportions will be substantially different in future. On the other hand it is not unlikely that there will be an increase in the proportion of artificial silk tops from the 2½ per cent recorded in recent months.

In woollen spinning the blending of materials is more complicated :

TABLE 22

RAW MATERIAL USED IN WOOLLEN SPINNING[1]

12 weeks ended 31st August, 1946.

(Clean, scoured weight in million lbs.)

	Apparel	Carpets, Mechanical Cloth, Hat Felt	Total
Virgin Wool:			
Crossbred	15.52	5.41	20.93
Merino	10.13	0.76	10.89
Other (East Indian, etc.) ..	0.35	1.43	1.78
TOTAL ..	26.00	7.60	33.60
Other Wool:			
Noils	2.40	0.86	3.26
Wastes	4.29	0.39	4.68
Mungo and Shoddy ..	10.73	0.18	10.91
TOTAL ..	17.42	1.43	18.85
Other Fibres:			
Artificial silk	0.41	0.04	0.45
Cotton	1.78	0.05	1.83
Hair and other fibres ..	0.76	0.99	1.75
TOTAL ..	2.95	1.08	4.03
GRAND TOTAL ..	46.37	10.11	56.48

[1] For Civil purposes only. *Source: Wool Control*

Wool, mainly of crossbred types, provides a little over half the material for apparel woollen yarns ; noils, wastes, and recovered wools, mainly the latter provide just over two-fifths ; the remaining 8 per cent is made up of rayon, cotton, hair, and other fibres. These proportions have changed enormously over the past forty years. In 1907 not more than about a quarter of the raw material used in the manufacture of woollen yarn consisted of virgin wool ; in 1935 the proportion had risen to about 45 per cent ; it is now over 50 per cent. The days when, as one witness put it, " they hoisted the flag at Morley Town Hall when a bale of wool arrived " are almost forgotten.

THE MARKETING OF RAW MATERIALS AND INTERMEDIATE PRODUCTS

RAW wool reaches the user through various channels. Much of it is bought in the country of origin, either at regular auctions or by contract with the grower. In Australia, the most important source of supply, 90 per cent is normally marketed at auctions held in the country, and most of the remainder is shipped

to London and sold at the London auctions. Many other overseas producers sell their wool in London either through their U.K. companies or through U.K. concerns acting on their behalf.

The London auctions are conducted by selling brokers acting on behalf of overseas producers, and by buying brokers acting on behalf of wool merchants, topmakers, spinners, export merchants, etc. One of the main functions of the auctions is to provide raw material in specified qualities and quantities for immediate delivery, so that the auctions are used by those who normally buy direct from the producer and require prompt supplies from time to time to fill an immediate need, as well as by those who confine their buying to this medium. The use of the London auctions by foreign buyers is a useful source of foreign exchange to this country. Whether the wool goes direct from the producing country to foreign buyers, or is first imported into this country, sorted and graded here, and subsequently re-exported, the entrepôt trade is a source not only of profit to the British merchants participating, but also an invisible export trade of value to the country.

After sale at the auctions the wool either comes into the hands of wool merchants and topmakers or passes to spinner combers. The function of the merchants is to purchase the raw wool, grade it and sort it, and to hold sufficient stocks of raw material to meet the demands of their customers at the next stage. The carrying of such stocks by the merchants, and their ability to deliver prompt supplies of raw wool to their customers, means that the actual users are relieved both of the need to maintain a skilled buying organisation, and, more particularly, of the need to provide additional finance to carry the stocks of raw material with the attendant price risks involved.

The wool merchants frequently scour or carbonise wools, producing special types to meet customers' requirements or for export in this form. The scouring and carbonising is done mainly by commission processors or sometimes by merchants operating their own plants.

The function of the topmaker is to buy the raw wool, have it sorted and graded, and have the tops made and delivered to the worsted spinners, leaving the noils to be delivered to the woollen manufacturer. The tops are made either by a commission comber or in the topmakers' own combing plant. The functions, and service to the industry, of the topmakers are, in the terms of stock holding, finance and raw material risks, the same as those of the wool merchant.

Both in raw wool and in tops there is an important export trade from this country, of which the traders already mentioned form an integral part. The bulk of the trade in woollen and worsted yarns is done direct from the yarn spinner to the consumer, and the importance of the merchant, except in the export trade, is not great. This applies not only to yarns for weaving into cloth, but also to hand-knitting and hosiery yarns. In the export of worsted yarns, merchants outnumber spinners and handle about half the trade.

Rags for the manufacture of shoddy and mungo are collected throughout the country by a very large number of merchants ranging from small collectors of the " rag-and-bone " type to substantial firms. The supply includes tailors' and hosiery clippings and is supplemented by imports. The material collected is either sold to the shoddy manufacturers, who in turn sell it after treatment to the woollen spinners, or, occasionally it is sold direct to woollen spinner manufacturers. There is thus no important volume of merchanting between the shoddy manufacturer and the woollen spinner or spinner-manufacturer.

In the collection of waste, the merchant plays an important part. This is not unusual, and is equally true of the collection of scrap and waste in most other British industries.

We do not consider it to be the function of the processor to run market risks by holding excessive stocks of raw material. The merchants in the distributive chain necessarily hold stocks and are therefore bound to bear price risks. Manufacturers must also carry some stocks, either of raw materials or of their own finished products. Fluctuations in raw material prices, therefore, must ultimately be reflected in the value of the stocks held by manufacturers, and must place upon them additional risks, responsibilities, and work, which it is not their business as manufacturers to bear.

Unlike a large number of other industries using primary commodities, the wool textile industry is especially vulnerable to fluctuations in the price of raw wool because of the absence of an organised forward market through which those risks can be off-set. It is, of course, possible for processors who make sales of their products to purchase their supplies of raw material simultaneously by placing forward contracts. But the minimum stock dictated by the needs of the manufacturing process must always be subject to market risks. Moreover the qualities of wool required may not be continuously available throughout the year.

We have considered the desirability or otherwise of an organised futures market to cover this difficulty. We understood that before the war such markets were in existence, both in New York and Antwerp, but that they were little used by the British wool textile industry. Owing to the extreme complexity of raw wool, and the vast number of individual types, it would be difficult to find a suitable standard from which the stocks essential for the smooth operation of such a market could be provided.

THE BRITISH CLIP

A HUNDRED years ago two-thirds of the wool consumed in the United Kingdom was home-grown. The position is now very different. Home-grown wool is less than a tenth of the total wool consumed; part of what is retained is used in the manufacture of carpets and rugs; and a third to a half of the total clip is exported. This is a transformation all the more striking in view of the high reputation that British wool had centuries ago.

Apart from the mountain breeds, whose wool is largely of carpet quality only, British sheep are kept for mutton and lamb rather than for their wool. The inherent quality of the wool of British mutton breeds, particularly in pure-bred Down and long-woolled flocks, is good, but this quality is rarely reached because the return is not regarded as sufficient to repay careful shearing and assembly for market. The farmer generally sells in small lots because flocks are on the average small, and the mixed character of the clip, due largely to extensive cross-breeding, is an additional factor tending to depress the price. Nevertheless, quality for quality, British wool makes prices comparable with those paid for imported wool.

During the war, the British clip was requisitioned by the Government at prices above those of comparable Dominion types and this arrangement has been continued during the current wool year. In 1947 other methods of disposal will have to be introduced and discussions are now proceeding on the

basis of the Report of the Wool Marketing Committee published some months ago. In view of the arrangements already entered into with the Dominion Governments for the disposal of surplus wool* the Government have recognised that they have an obligation towards the home producer and will no doubt seek to maintain good facilities for the collection, grading and appraisement of the clip in the interests both of British agriculture and the wool textile industry. As the system of marketing has already been the subject of a recent official report, however, we make no recommendations.

SOUTH AMERICAN AND INDIAN WOOLS

APART from Dominion wools which are the direct concern of the joint organisation described later in this chapter, there are two other main categories, namely South American wool and Indian wool.

South American wool is predominantly of the apparel type and mainly cross-bred. During the first year of the war, before the collapse of France had made it clear that our supplies of Dominion cross-bred would be adequate for our war-time needs, some South American cross-bred wool was purchased by the Government. Since then the import of South American wool into the United Kingdom has been stopped and this ban has remained in force with the exception of some speciality wools from the Argentine, imports of which have recently been sanctioned on supply grounds. The admission of imports on a freer footing so as to facilitate the eventual establishment of an international market in wool is, however, understood to be under consideration.

Indian wool is essentially a carpet wool. The great bulk of Indian exports came to the United Kingdom before the war for sale by auction at Liverpool, the trade being traditionally in the hands of the East Indian Wool Importers and the Liverpool brokers. The private character of this trade, through which the needs of the carpet, blanket and felt manufacturers were met, was not interfered with during the war. Indian wool like Dominion wool, obtained the benefit of a subsidy from the middle of 1942 until its abolition at the end of April, 1946. Since the end of the war it has been in increasing demand chiefly to supplement British wools in carpet manufacture.

THE GROWING USE OF MERINO WOOL

THE use of merino wool, all of which is imported, has been steadily increasing and the modern tendency is all in favour of fine soft-handling wools. The output of merino tops was as follows:

TABLE 23

PRODUCTION OF TOPS, MERINO AND OTHERS

	Merino Tops (Million lbs.)	All Tops (Million lbs.)	Proportion of Merino to Total
1924	75.6	285.5	26.5
1930	98.2	224.4	43.8
1933	150.5	309.6	48.6
1935	161.4	307.5	52.5
1937	141.5	278.5	50.1
Sept., 1945 to Aug., 1946	105.1	162.9	64.5

Sources: Census of Production and Wool Control

* See "The Disposal of Surplus Stocks."

This trend has involved an increased dependence on Australian and South African supplies since these two countries, together with the United States, produced nearly 1,300 million pounds of merino wool out of a world total of about 1,400 million pounds in pre-war years. The supply in 1937-8 and imports into the U.K. in 1938 were as follows :

TABLE 24

SOURCES OF SUPPLY OF MERINO AND CROSS-BRED WOOL

(*Million lbs. greasy*)

	Merino		Cross-bred	
	Production 1937–38	Imports into U.K.[1] 1938	Production 1937–38	Imports into U.K.[1] 1938
Australia	833	291	182	36
Union of South Africa	241	103	5	—
New Zealand ..	12	4	285	153
United States ..	227	—	227	1
Argentina	53	2	322	67
Uruguay	15	2	101	17
Other countries ..	47	4	553	23
TOTAL ..	1,428	406[2]	1,675	297[3]

[1] Excluding pulled, sliped, cleaned, scoured or carbonised.

[2] Re-exports of imported merino wool during 1938 amounted to 105 million lbs.

[3] Re-exports of imported cross-bred wool during 1938 amounted to 116 million lbs.

Sources: Trade and Navigation Accounts and Imperial Economic Committee

The increased use of merino relatively to cross-bred wool has not been confined to the worsted trade ; nor has the switch to merino wool ceased since the end of the war. Indeed the substitution of civilian clothing for uniform cloths which are largely made of cross-bred wool has given it a fresh impetus. The following figures give the consumption in both sections of the industry in the first year of the war and the first six months to February 1946 (expressed as an annual rate) :

TABLE 25

CONSUMPTION OF MERINO AND CROSSBRED WOOL IN U.K.

	Consumption of Wool			
	Woollen Yarn (Million lbs. Clean)		Topmaking (Million lbs. Clean)	
	Sept. 1939 to Aug. 1940	Sept. 1945 to Aug. 1946	Sept. 1939 to Aug. 1940	Sept. 1945 to Aug. 1946
Merino	34.1	43.6	190.3	127.3
Crossbred*	129.3	93.6	163.3	63.3
TOTAL ..	163.4	137.2	353.6	190.6

* Not including East India Wool.

Source: Wool Control

THIS increased dependence on merino wool has coincided with a tremendous expansion in the use of wool of similar grades in the United States. From meeting 80 per cent of her requirements of apparel wool from domestic sources the United States has moved, within a few years, to importing over 80 per cent. Over the same period, her demand for wools of apparel quality has more than doubled. The consumption of imported wool, therefore, has risen eightfold, and in 1946 has been at the rate of over 500 million pounds per annum on a clean basis. The world's annual wool clip is no more than some 2,000 million pounds on a clean basis and the export surplus of the five leading exporting countries is only about 1,000 million pounds on a clean basis. It is obvious, therefore, that if America's consumption of wool remains near its present level she will occupy a position in world trade in this material comparable with our own.

TABLE 26

U.S. ANNUAL RAW WOOL CONSUMPTION BY CLASS AND ORIGIN

[*Millions of lbs. (scoured basis) and per cent*]

Annual Total or Average	Apparel Class				Carpet Class		Total					
	Domestic		Foreign		Foreign		Domestic		Foreign		Total	
	lbs.	Per Cent	lbs.	Per Cent	lbs.	Per Cent	lbs.	Per Cent	lbs.	Per Cent	lbs.	Per Cent
1923–25 ..	149	55	122	45	100	100	149	40	222	60	371	100
1926–30 ..	163	68	77	32	92	100	163	49	169	51	332	100
1931–35 ..	210	90	22	10	69	100	210	70	91	30	301	100
1936–40 ..	211	75	69	25	96	100	211	56	165	44	376	100
1941–45 ..	189	33	382	67	62	100	189	30	444	70	633	100
1945 ..	121	20	470	80	57	100	121	19	527	81	648	100
1946[1] ..	95	16	510	84	120	100	95	13	630	87	725	100

[1] Estimate.

Source: Rayon Organon

That America will rely more heavily than in pre-war years on imports seems certain. Her domestic supplies are already heavily subsidised, but are accumulating in surplus stocks while the higher grades of imported wool find a ready market. This preference for imports is due to a variety of circumstances: to the relatively high cost of domestic wool in spite of the subsidy over the past few years; to the high level of consumers' demand, which creates a large market for better quality goods and indirectly for high grade raw material; to experience during the war, when the American army was largely clothed with merino; and to the general shortage of labour, since less labour is needed in the processing of imported wool. These circumstances are not likely to operate in future with the same force as at present. The consumption of domestic supplies of wool must eventually increase, and the competition of other fibres will grow. Above all there may well be some reduction in American consumption of wool textile manufactures and the burden of any reduction will tend to fall on imported material. Nonetheless, increased American competition for the surplus of exportable wool—and particularly merino wools—has obviously to be reckoned with.

THE DISPOSAL OF SURPLUS STOCKS

THERE is, of course, no immediate danger of a shortage of wool, nor even of a shortage of merino qualities. A large stock, amounting at the 30th June, 1945, to 4,000 million lbs. (greasy and scoured), was accumulated in the course of the war. Most of this stock was in the hands of the U.K. and was held in the Dominions. Wool was acquired by the U.K. Government as a result of the agreement entered into with the Australian and New Zealand Governments in 1939, when arrangements were made for the purchase of the entire Australian and New Zealand clip; the South African clip was purchased from August 1940 onwards. A stock was gradually built up, chiefly because of the absence of Continental buyers from the market.

At the end of the first world war, when the stock was only one-fifth as large, there was great difficulty in disposing of the surplus and it was several years before it could be marketed. In 1945 the stock was equal to two years' consumption and at that time it was estimated that even on reasonably optimistic assumptions it could only be disposed of concurrently with the annual clip over a period of 12 to 13 years. It was decided, therefore, to set up a Joint Organisation in order to dispose of the surplus Dominion wools over a period of years, and in such a way as to maintain reasonable stability of prices. The Joint Organisation was incorporated as a limited Company in May 1946, under the title of U.K. Dominion Wool Disposals Ltd., and took over the British Government's holdings on behalf of the four Governments concerned, viz. the United Kingdom, Australia, New Zealand, and South Africa.

These holdings by the end of June 1946 had fallen to 1,968 million lbs. compared with 3,210 million lbs. at the end of July 1945—a drop of 40 per cent in 11 months. This reduction still leaves the equivalent of about 18 months production in the Dominions in stock, and since it was to some extent the outcome of the re-stocking of the Continent at all stages of production it is hardly likely to proceed with equal rapidity in the future. The previous estimate that it would require 12–13 years to clear the surplus does now seem, however, to have been pitched too high. It is perhaps significant, that a quarter of the total sales, or the equivalent of half the annual clip was purchased by the United States and that these purchases did not result in any large increase in stocks of imported wool in that country.

The detailed composition of the Joint Organisation's stock was made known in August 1946, and shows that, although it includes a wide variety of grades and qualities, the bulk of the stock is of what are known as "Continental" types of wool, and much of the stock is high in burr, i.e. it contains a high proportion of impurities and vegetable matter. The reasons for this situation are, first, that the Continent was cut off during the war years and that the American market, which took a much larger proportion of the total world supply, drew on "spinner" types of wool of high quality and relatively free from burr. It was also essential, in order to save labour and shipping space, to select from the current clips those qualities of wool that were easiest to process and lowest in grease. In addition, when the Continental market re-opened there was a natural preference for wools that made the least demands on the skill of the operatives. The current stock, therefore, consists largely of wools that are high in grease, short in fibre and contain an abnormal amount of burr. Since the accumulation of a surplus of these types reflected an effort to make the

utmost use of wools that would save labour in processing, the absorption of the stock will put a slight additional burden on employment from now on. Although it is too early to draw deductions from the sales that have only recently re-opened it is to be expected that the wools in stock will bear a discount compared with the current clip, and that there will be a wider spread of prices between the burr-free and non-Continental types and the types that are in abundant supply. This greater spread of prices is likely to last as long as the surplus remains for disposal.

A situation of this kind is not novel, since even in pre-war days the United States, in occasional incursions into the market, was able to outbid other countries for the highest quality wool. Apart from the higher percentage of burr, there is nothing to suggest that the range of qualities in stock is incapable of meeting the trade's requirements. It will, however, be necessary for the British manufacturer to consider how he can best make use of the surplus wool if, as may well happen, an abnormal proportion of the current clip is bought by other countries. In the long run, if the United States continues to be a heavy buyer, the British industry will have need of its traditional ingenuity in making the best use of the raw material available.

In disposing of the surplus the Joint Organisation is aiming at greater stability of prices. In pre-war years the fluctuations in the price of wool, whether from season to season or within each season, were not greater, or not appreciably greater, than in most other staple commodities such as wheat, copper, rubber, etc.[1] Nevertheless not only were they of greater amplitude than in the period before 1914 but they were very wide and disturbing.

The mechanism by which it is hoped to keep prices steadier is by the fixing of prices at which the Joint Organisation will buy at the auctions, combined with regulation of offerings from its stocks. If wool were a uniform commodity the task of the Joint Organisation would be a simpler one. In practice, however, it is likely to find that the fixing of price differentials to correspond with the demand for the different grades of wool is extremely complex and difficult; it is likely, therefore, that while wool prices remain relatively steady on the average, there will be considerable fluctuations in the price of particular grades.

We gave some consideration to the question whether the Joint Organisation might be converted into an agency for the bulk purchase of wool on behalf of the Government, and whether this would enable prices to be stabilised to the mutual advantage of the grower and the manufacturer. We recognise that in the past the instability of the price of raw material has exercised an unsettling influence over the industry and it has tended to divert from questions of manufacturing efficiency too much of the energies and enterprise of a substantial part of the trade; we are anxious therefore to see the price of wool maintained at as stable a level as possible.

The instability of prices in pre-war years was largely the result of fluctuations in world demand associated with variations in trade and employment in the main consuming countries. The most effective contribution to more stable

[1] In the years 1929–38, the average spread between lowest and highest prices in each year was about 33 per cent of the 10 year price average; in cotton it was 24 per cent; in wheat, 30 per cent; in copper, 35 per cent; in rubber, 55 per cent. The average change in price from year to year over the same period (expressed as a percentage of the 10 year price average) was about 27 per cent in wool, 18 per cent in cotton, 17 per cent in wheat, 22 per cent in copper and 31 per cent in rubber. (Dr. Gerda Blau: "Wool in the World Economy," Tables XIV and XV).

wool prices would be continuous full employment in the world and the absence of inflationary or deflationary movements. No change in the machinery of marketing would be likely to meet with complete success in stabilising the price of wool in the absence of measures designed to avert fluctuations in world trade and employment.

Nevertheless improvements and additions to the machinery of marketing may make an important contribution to greater stability. We have not examined in any detail any suggestion for the present conversion of the Joint Organisation into some other form of agency for this would be inconsistent with the decision of the Government, recently concluded in unison with the Governments of the three Dominions primarily concerned, to resume the system of auctions and to establish concurrently the organisation for the dual purpose above described. But we have noted that it is provided in the Government plan that the operation of the system should be reviewed in four years' time; and we consider that when that review is undertaken, it should embrace the whole question of the practicability of measures to secure price stability whether by continuing the Joint Organisation on a permanent basis or by other means.

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FUEL AND POWER

THE industry is a heavy consumer of fuel and power. In 1937 the consumption of coal reached a total of 1.8 million tons and the consumption of electricity was about 400 million kwh. Coal is used partly in order to generate steam and for process heating, especially in combing and dyeing and partly as a source of power; electricity either bought or generated in the works is used chiefly for power and lighting; and a small amount of heavy fuel oil is used for various purposes.

During and since the war special efforts have been made to economise fuel and in this work the Fuel Efficiency Committee of the Woollen and Worsted Trades Federation has played a leading part. The economies that have so far been made have been estimated at 15 per cent of overall consumption. These economies have been due to a variety of measures including the introduction of fluorescent lighting, thermostatic control, the insulation of shed roofs and improved steam piping.

The Committee of the Woollen and Worsted Trades Federation, however, does not cover combing, worsted spinning and commission dyeing and finishing. Many firms in those sections of the industry make efficient use of fuel and some have even set up special departments to deal with fuel problems. It would seem desirable that there should be joint action covering the entire industry. We suggest therefore, that the Wool Textile Delegation should give consideration to the formation of a Fuel Efficiency Committee for the industry, including commission dyeing and finishing.

The use of heavy fuel oil in replacement of solid fuel for steam-raising is not at present an economic proposition. Apart from the capital cost of converting boilers from coal to oil consumption and the difficulty of obtaining the necessary plant within a reasonable time, there would have to be storage facilities to hold 2½–3 weeks' supply of oil. The running cost, taking 1.6 tons of coal at a cost of 41s. 3d. per ton against 1 ton of fuel oil at a cost of £6 10s., would be nearly doubled. It may be that the comparison is more favourable at locations

nearer the ports where oil is stored but it would require a very large change in relative prices to make fuel oil work out more cheaply.

It may be mentioned in passing that the cost of steam-raising has risen fivefold in the past 40 years and that this in itself is some incentive to greater economy. At four woolcombing establishments the cost per 1,000 gallons of water evaporated was 45–50d. in 1910, 110–118d. in 1939, and 250–290d. in 1946. The rise in cost since 1939 is due to a deterioration in quality as well as to a rise in price. The ash content increased steadily from 5½ per cent in 1939 to 21½ per cent in 1943 and in another grade of coal from under 14 per cent in 1941 to 19½ per cent in 1946. The calorific value of the coal has shown a similar deterioration.

The use of electricity has grown rapidly. There are no figures of the power plant in use later than 1930, when the horse power of the electric motors installed was 190,000. At that date there was already a tendency to replace reciprocating steam engines by steam turbines and this has continued since. The power plant of the industry in 1930 is shown in Table 27. It will be observed that there were still a number of water-driven engines.

TABLE 27

THE POWER PLANT OF THE WOOL TEXTILE INDUSTRY, 1907–30

Power

	1907	1912	1924	1930
Prime Movers (HP)				
Reciprocating steam engines	297,501	334,187	390,720	341,404
Steam turbines	2,025	2,776	31,905	49,048
Internal combustion engines	10,822	13,813	17,306	14,197
Water engines	14,896	12,409	10,022	9,737
TOTAL ..	325,244	363,185	449,953	414,386
Electric Motors (HP)				
Driven by electricity generated in same works ..	—	19,141	66,600	92,805
Purchased electricity.. ..	—	11,984	77,591	97,876
	—	31,125	144,191	190,681

Source : Census of Production

Between 1930 and 1937 the consumption of electricity doubled and until the concentration of the industry during the war it continued to increase. Manufacturers are alive to the advantages of individual electric drive, especially in weaving, but more extensive electrification is limited by the shortage of electric motors and generating plant. The direct economies in cost vary with the type of plant. In a well-designed combing plant, for example, with a reciprocating engine coupled to the main line shafting, from which worsted cards are driven directly by means of belts, the total friction losses in the prime mover and shafting may be as low as 18–20 per cent of the total power generated. As this is less than would be experienced with individual electric motor drive to each machine, there would be little to be gained in manufacturing efficiency by

scrapping the existing layout in favour of individual drive. A mill installing a new power plant would be likely to use a steam turbine providing steam and electric power simultaneously; but the savings in running costs would generally be too small to warrant the scrapping of existing reciprocating engines.

Among the major advantages of individual electric motor drive are the improvements in the general appearance of the factory through the removal of overhead shafting and belting and the better lighting and decoration that are made possible. This is a point to which we shall return later in discussing working conditions and the recruitment of labour.

CONCLUSIONS AND RECOMMENDATIONS

BRITISH manufacturers must consider how best to use wool offered from the surplus stock held by the Joint Organisation if an abnormal proportion of the current clip is bought by other countries. (*Page* 40.)

Past instability in the price of wool has exercised an unsettling influence over the industry. The most effective contribution to more stable wool prices would be continuous full employment in the world and the absence of inflationary and deflationary movements. (*Pages* 40 *and* 41.)

But improvements and additions to the machinery of marketing may make an important contribution and when the operation of the plan for the Joint Organisation is reviewed in four years time the review should embrace the whole question of the practicability of measures to secure price stability whether by continuing that organisation on a permanent basis or by other means. (*Page* 41.)

The Wool Textile Delegation should give consideration to the formation of a Fuel Efficiency Committee for the whole industry. (*Page* 41.)

CHAPTER V. MAN POWER

IN the ten years before the war, unemployment in the wool textile industry (including partial unemployment) averaged 20 per cent compared with 16 per cent in industry as a whole. At its highest, in 1931, unemployment reached 37 per cent, but in the summer before the war it had fallen to about 6–7 per cent. The memory of these years of depression naturally hangs over the industry as a discouragement to parents to advise their children to take employment in it, and as a deterrent to workers who have found employment elsewhere to abandon it and come back. It is difficult for workers to adjust their outlook to conditions of acute labour shortage such as now exist and may well continue for a long time to come. Nevertheless the major problem before the industry has undergone a radical change in the course of the war from one of too much to one of too little man-power, and the new shortage may prove just as difficult to overcome as the previous surplus.

The number of workers in the industry fluctuated in the hundred years before the war between 200,000 and 300,000. Immediately prior to the war there was a gradual trend downwards, and in 1939 there were 227,000 insured workers compared with about 260,000 in 1924. In the course of the war a much more drastic reduction took place in consequence of the release or direction of man-power to munitions and the armed forces. After the introduction of clothing rationing and the completion of concentration the labour force fell to a minimum of about 126,000 at the end of 1944.

TABLE 28

WOOLLEN AND WORSTED INDUSTRY (GREAT BRITAIN)

ESTIMATED NUMBERS INSURED EMPLOYED AND UNEMPLOYED, 1924–46

(000's)

Date (1)	Age (2)	Estimated Total Numbers of Insured Persons (Employed and Unemployed) (3)	Numbers of Insured Persons Unemployed July (4)	Estimated Numbers of Insured Persons in Employment Col (3)–Col. (4) (5)	Per Cent Unemployed (6)
Mid 1924	16 and over	260.5	19.0	241.5	7.3
„ 1925	„ „	254.9	55.1	199.8	21.6
„ 1926	„ „	252.3	59.2	193.1	23.5
„ 1927[1]	„ „	248.0	23.6	224.4	9.5
„ 1927	16–64	238.6	23.6	215.0	9.9
„ 1928	„	241.4	36.5	204.9	14.7
„ 1929	„	237.7	37.7	200.0	15.4
„ 1930	„	239.3	62.6	176.7	26.2
„ 1931	„	237.8	86.4	151.4	36.4
„ 1932	„	232.6	63.2	169.4	27.2
„ 1933	„	230.0	30.0	200.0	13.0
„ 1934[2]	„	228.7	55.5	173.2	24.3
„ 1935	„	220.7	30.8	189.9	14.0
„ 1935	14–64	237.0	31.0	206.0	13.1
„ 1936	„	240.3	25.1	215.2	10.4
„ 1937	„	239.3	23.3	216.0	9.7
„ 1938	„	229.0	47.6	181.4	20.8
„ 1939	„	226.5	14.3	212.2	6.3
„ 1940[3]	„	230.5	7.4	223.1	3.2
„ 1940	Males 14–64;	227.8	7.1	220.7	3.1
„ 1941[4]	Females, 14–59	202.9	7.6	195.3	3.7
„ 1942	„	162.0	0.9	161.1	0.6
„ 1943	„	140.9	0.4	140.5	0.3
„ 1944	„	126.2	0.2	126.0	0.2
„ 1945	„	126.7	0.3	126.4	0.2
„ 1946	„	146.5	0.8	145.7	0.5

[1] Persons aged 65 and over ceased to be insured in January 1928.
[2] Juveniles aged 14 and 15 became insurable in September 1934.
[3] Women aged 60–64 ceased to be insured in July 1940.
[4] Including 1,640 non-manual workers earning £250–£420 a year who became insured in September 1940.

Source: Ministry of Labour

TABLE 29

NUMBERS INSURED IN THE WOOLLEN AND WORSTED INDUSTRY[1]

(1924–46)

(000's)

	Men	Women	Boys	Girls	Total
1924	101.3	134.8	8.8	15.6	260.5
1930	88.6	130.9	6.5	13.3	239.3
1933	89.8	125.1	5.4	9.7	230.0
1935	88.0	119.9	10.2	18.9	237.0
1939	85.0	110.0	10.4	20.1	226.5
1944	45.3	61.8	6.0	13.1	126.2
1945	45.0	64.1	5.4	12.2	126.7
1946	60.1	68.2	5.4	12.8	146.5

[1] The ages covered at the various dates are as shown in Table 28 above.

Source: Ministry of Labour

From November 1944, onwards there has been a gradual increase in employment. Since the end of the war with Japan it has been at a rate comparable with the rest of the textile and clothing industries, but extremely disappointing in relation to the unsatisfied demand for cloth, both in home and export markets. Between September 1945, and the end of July 1946, the average increase was not much more than 13 per cent, i.e. just over 1 per cent per month. The numbers employed at September 1939, November 1944, September 1945, and September 1946, were roughly as follows :

	Wool Control All Workers Incl. Managerial and Clerical	*Ministry of Labour No. of Insured Workers in Employment*
September 1939 ..	224,000	207,600
November 1944 ..	137,800	128,500
September 1945 ..	142,600	131,900
September 1946 ..	166,369	153,600

Broadly speaking, therefore, the labour force was reduced during the war by nearly 40 per cent, and is still over 25 per cent less than in 1939. In mid-1946, moreover, there were signs of a slackening in the upward movement in employment. From the middle of April to the middle of July the net increase was approximately 200 a week ; in the previous quarter it was about twice as high. This change in trend was largely due to a much higher rate of wastage following upon the removal of the Essential Work Order. No doubt there was some movement of workers between firms, so that both intake and wastage were inflated. Deconcentration also involved a movement of labour from a running factory to one previously closed. Nonetheless it is disturbing that labour turnover should be at the rate of 1,500 per week on a labour force of 160,000, especially when the net increase in employment is not more than about 200 per week.

As the figures of recruitment include both new entrants to the industry and workers returning from the armed forces, we have obtained separate details excluding the latter. The figures are set out below for the two periods of nine months, July 1944—March 1945, and July 1945—March, 1946 :

ENTRANTS AND RE-ENTRANTS INTO THE WOOL TEXTILE INDUSTRY
(*Excluding Workers Returning from the Armed Forces*)

	Men			Women		Total	Grand Total
	14–20	21–64	Total	14–20	21–59		
July '44–Mar. '45	1,247	148	1,395	2,125	1,839	3,964	5,359
July '45–Mar. '46	1,217	327	1,544	2,480	3,153	5,633	7,177

It will be seen that there has been a slight improvement in the recruitment of girls, and a much greater improvement in the recruitment of women. The total gain to the industry, however, remains at no more than 800 per month, and it can be assumed that once demobilisation is complete this will be the gross rate of intake, unless special efforts are made. Allowing for the inevitable wastage from the industry, it would then be virtually impossible to make any appreciable net increase in numbers employed.

In the first half of 1946 there was a net gain in the number of men in employment but this increase was almost exclusively due to demobilisation. There was no net increase in the employment of women and there is still a very serious shortage of juveniles.

I. THE SHORTAGE OF WOMEN

THE wool textile industry is peculiarly dependent upon women workers. The ratio of women to men is normally 130 : 100 compared with an average for all employed persons of 35 : 100. The high proportion of women, especially in the West Riding, has only been maintained because of the quite exceptional number of married women and widows in insured employment in the textile districts.

The position can best be illustrated from the figures for Bradford. Whereas for the country as a whole there is, on the average, one woman in insured employment for every three men, in Bradford in 1939 there were two women in insured employment for every three men. This was a higher ratio than was achieved for the country as a whole even at the peak of the war effort when large numbers of men were in the armed forces and women not normally in insured employment were directed into it. Of the Bradford women in industrial employment in 1939, 56 per cent were in the wool textile industry and over a third of that number were married or widowed. These figures are a striking illustration of the dependence of the women of Bradford on this industry. But they are equally striking evidence of the dependence of the industry on the desire of women workers in the textile districts to seek paid employment. If the proportion of Bradford women in insured work were to fall to the national average, one woman in two would withdraw from employment and the loss would be certain to fall heavily on the wool textile industry. On the extreme assumption that the industry bore the whole of the loss it would be left, in Bradford and many other towns, without more than a handful of women workers. In fact, however, women made up in 1939 nearly 60 per cent of the numbers employed in the industry, and in September 1946 accounted for just over 50 per cent.

Although large numbers of women have withdrawn from insured employment since the end of the war, there is no evidence that there are fewer in employment now than in 1939. On the contrary, in the country as a whole, there were approximately 600,000 more women employed in June 1946 than there were seven years ago. In the North Eastern Region (the East and West Ridings Region), the number of women in employment (aged 18–59) increased from 307,500 in June 1939, to 343,600 in July 1946, while the number of girls (aged 14–17) fell from 85,000 to 77,500. It will not be possible for some months to measure the decrease since July 1946; but it can be assumed that making allowances for this decrease, the number of women in employment in the East and West Ridings Region remains higher than it was in 1939, although falling towards that level.[1] If this is so, the reduction in numbers employed in the wool textile industry in the West Riding is largely a reflection of the increase in employment in other directions. The same reasoning applies to other districts, such as the West of England. The shortage of women is due,

[1] There is evidence that the fall has been less rapid. In May 1946, the East and West Ridings Region was unique in recording a net increase in employment in manufacturing industry compared with June 1945. The fall in the number of women employed in manufacturing industry was proportionately lower than in any other region.

in other words, to the surrender of women to engineering and other industries during the war and to the continuance of a high level of employment in those industries since the war ended. Wool is paying now for the very thorough and successful mobilisation of labour that contributed to the winning of the war. Thus it is impossible to make any satisfactory assessment of the prospects of inducing women to return to the wool textile industry in anything like their pre-war numbers without considering simultaneously the prospects of the industries (and non-industrial employments) that are competing for women in the textile districts.

In order to see the problems in perspective, it is again necessary to refer to the general manpower position of the country. Although there are some 600,000 more women in employment, the numbers employed in manufacturing industry are only 40,000 higher; and the increase, therefore, has largely been in occupations and services outside the field of manufacturing industry. Within manufacturing industry, there has been a striking contrast between the war-expanded and the war-contracted industries: the metals, engineering, and chemical industries, which were greatly expanded, have retained much of the additional manpower that they employed in war-time; while the textile and other industries that were forced to contract have been unable to recover more than a fraction of what they lost.

This change in the industrial balance has been most apparent in industrial regions such as the West Riding, where the war-expanded industries were

TABLE 30

EAST AND WEST RIDINGS

Number of women and girls in employment in 1939 *and* 1946

	Women (18 and over)				Girls (14–17)			
	Estimated Numbers Insured		Estimated Numbers Employed		Estimated Numbers Insured		Estimated Numbers Employed	
	1939	1946	1939	1946	1939	1946	1939	1946
General engineering ..	4,980	18,410	4,761	17,887	1,440	2,480	1,420	2,468
Motor vehicles, cycles and aircraft	1,080	4,990	1,041	4,730	320	450	315	446
Steel melting hand tools, etc.	12,560	25,550	11,636	22,058	5,670	4,760	5,551	4,754
Hotels, restaurants, etc.	13,720	15,130	12,169	14,885	1,700	1,730	1,605	1,716
Distribution	49,760	48,260	46,248	47,893	15,090	19,390	14,777	19,330
Railways, buses and trams	2,040	10,460	1,967	10,077	240	520	240	517
National and Local Govt. service ..	9,250	32,550	8,708	32,065	1,090	3,670	1,068	3,659
Agriculture	1,000	3,530	863	3,480	150	690	138	684
Tailoring	41,520	24,740	39,101	24,710	10,500	6,160	10,406	6,154
Miscellaneous industries[1]	28,010	17,310	26,136	17,255	8,940	4,600	8,835	4,590
Woollen and worsted ..	91,930	54,470	85,030	54,420	15,520	8,850	15,273	8,842
TOTAL (inc. others)..	331,460	348,140	307,503	343,646	86,290	77,740	84,724	77,541

[1] Confectionery, etc., Cotton, Printing and Publishing.

Source: Ministry of Labour

previously of subordinate importance. The latest available figures for the East and West Ridings Region relate to July 1946 and the main changes since 1939 are shown in Table 30.

The largest increase since 1939 has been in " National and Local Government Service ", due, presumably, to the evacuation of Government Offices and to the rationing schemes and other kinds of Government control. There has also been a very large increase in the engineering trades, including motor vehicles and aircraft. (The numbers employed in these industries fell rapidly after the end of the war, but at July 1946 were still several times as large as in 1939.) Of the other groups showing an increase the two most striking are " Steel melting, hand tools, etc." and " Railways, buses and trams ". The groups showing a decrease are " Woollen and Worsted ", " Tailoring " and " Miscellaneous " and in each the decrease has been not far short of 40 per cent.

While the total number of women shows an increase, the number of girls shows a fall. The changes within the total are similar to those for women except that engineering and transport have gained comparatively few while distribution has gained heavily and now employs a quarter of the girls in the region. In 1939 there were more girls in the wool textile industry than in distribution ; in 1946 there were more than twice as many girls in distribution.

On the future prospects of employment in the chief competing industries and services it is not for us to comment. The real problem of manpower that faces the wool textile industry is how far the expansion in these industries and services *in the wool textile districts* represents a permanent feature of the situation, and how far some relief may yet result from such influences as the contraction in the munitions programme, a reduction in the civil service, the return of men to jobs at present performed by women in transport services, and so on. There can be no doubt, however, that, whatever the magnitude of the change, it must be in the direction of a net increase in employment outside the wool textile industry, and that, unless more women than in 1939 can be induced to remain in employment, the industry will bear the brunt of a change in the industrial balance in the wool textile districts.

The chances of adding still further to the total number of women workers in employment in the wool textile districts are obviously not large. Present rates of direct taxation and present shortage of consumer goods undoubtedly reduce the incentive to seek employment and to work overtime. There is a natural desire on the part of married women to give more time to their families. A policy designed to halt the decline in the birth-rate will necessarily operate in the same direction, especially as the birth-rate in the textile districts has traditionally been below the national average.

There is, moreover, an important influence which will be felt increasingly. This is the general ageing of the population. As women tend to retire from work earlier than men, the general ageing of the population is likely to cause an earlier and heavier reduction in the working population of women than in men. This will particularly affect industries such as textiles which normally employ a high proportion of women.

However, this may be, there is evidence to show that the reduction in the number of women in the wool textile industry is not entirely due to war circumstances. There was a reduction from 1924 onwards and this reduction, especially after 1930, was much more rapid than the fall in the employment of men. The chances of attracting more women into the wool textile industry,

therefore, turn mainly upon the future level of employment in other occupations in the textile districts. But even if there were a large contraction in competing employments, (which is unlikely) this by itself would not produce an influx into the industry. There is evidence that many women are reluctant to enter or re-enter the industry from a variety of motives. The Ministry of Labour, in evidence, told us that there was :

> " a preference amongst women who have worked in engineering for engineering work. . . . Women who are willing to go out to work have a very much wider choice. . . . That is, of course, a very serious matter for the textile industry ".

A special survey was undertaken by the Ministry of Labour of the reasons given by women offered employment in the wool textile industry for declining such employment. The results are shown in Table 63 (Appendix VII), and show the proportion of those interviewed who said that they did not like mill work or thought the working conditions in the mills unsatisfactory.

All things considered, therefore, present plans should be based on the assumption of a continuing shortage of women workers as compared with the number employed by the industry, in its existing locations, in pre-war years.

2. THE SHORTAGE OF JUVENILES

IN pre-war years the industry gave employment to about 30,000 juveniles under the age of 18. These represented about one-seventh of the total labour force ; the number now in employment is about 20,000—again about one-seventh.

Juveniles are of particular importance in some sections of the industry. In worsted spinning, for example, 23 per cent of the workers at September 1945 were under 18½ (men) or 18 (women), compared with 14 per cent for the industry as a whole. One of the main operations performed by juveniles is doffing and where automatic self doffers are not in use or cannot be used (as in mule and ring spinning) it is necessary to employ adults on work that could readily be performed by juveniles. In weaving juveniles are of special importance in reaching-in, and also as the natural trainees for weaving.

If the industry had not undergone such a drastic contraction it would be unnecessary to recruit more juveniles than the number of workers normally leaving the industry through retirement, etc. In order to rebuild the labour force, however, a higher rate of juvenile recruitment is desirable if not indeed indispensible. This higher rate of recruitment is not being achieved. On the contrary the evidence goes to show that whereas in 1939 about 40 per cent of the school-leavers in the West Riding entered the wool textile industry, in 1945 the proportion had fallen to about 20 per cent. It was hardly to be expected that the proportion would be normal in that year and the reduction was roughly in keeping with the change in the relative numbers employed in the wool textile and other industries. There is some indication that in 1946 there has been an improvement. But the pre-war rate has not yet by any means been restored. It will be seen from Table 31, for example, that of the juveniles placed at eleven of the chief wool textile district Local Employment Exchange Offices in the West Riding, 15 per cent entered the wool textile industry

in 1946 compared with 20 per cent in 1939*. The building industry shows the largest improvement over 1939, followed by engineering, these two groups together taking 23 per cent of all juveniles placed compared with 13 per cent in 1939.

TABLE 31

PLACINGS OF JUVENILES THROUGH THE MINISTRY OF LABOUR AND LOCAL AUTHORITIES IN 1939 AND THE FIRST HALF OF 1946

	Local Offices Group A[1]				Local Offices Group B[2]	
	1939		First Half, 1946		First Half, 1946	
	Number Placed	Per Cent	Number Placed	Per Cent	Number Placed	Per Cent
Wool Textiles	2,798	20	887	15	293	35·5
Engineering ..	1,561	11	992	17·5	89	11
Distribution ..	988	7	422	7·5	32	4
Clothing ..	2,392	17	613	11	10	1
Building ..	293	2	325	6	29	3·5
All other ..	6,077	43	2,441	43	374	45
TOTAL ..	14,109	100	5,680	100	827	100

[1] Batley, Bradford, Brighouse, Bingley, Dewsbury, Halifax, Huddersfield, Keighley, Leeds, Shipley and Wakefield.

[2] Guiseley, Haworth, Holmforth, Morley, Otley, Silsden, Skelmanthorpe, Slaithwaite, Sowerby Bridge, Spen Valley, Stanningley.

Source : Ministry of Labour

The recruitment of juveniles from secondary schools in the past few years has been particularly disappointing. In 1945 of 566 children leaving Bradford secondary schools only 21 entered the wool textile industry†. It cannot be in the long-run interest of the industry that it should appeal so little to, or draw so little upon, the brighter and better-educated children of the districts in which it is located.

The loss in numbers due to the greater popularity of other industries has been reinforced by a reduction in the total number of new entrants. This is due firstly to the fall in births. In Bradford the average number of births in the years 1922–4 was 5,150; 10 years later the average was 4,015, a reduction of 22 per cent. This reduction should correspond broadly with the reduction in school leavers between 1937 and 1947. Secondly, the raising of the school-leaving age in 1947 will cut off for an entire year the whole of the inflow of juveniles, and so aggravate the shortage. In the higher age groups, the continuance of conscription will have a similar effect.

The shortage of juveniles, therefore, so far from disappearing, is likely to become still more acute, and it will be necessary to adapt the work of the industry to take account of this shortage.

* These offices are heavily weighted by the inclusion of Leeds, so that the percentages are below the average for the West Riding.

† For senior schools the figures were 2,475 and 727.

3. THE RETIREMENT OF OLDER WORKERS

THERE is a tendency in all industries for the average age to increase, and it is not easy to make a comparison between the wool textile industry and the average. But there is ample evidence that the industry is now far more heavily dependent upon older workers than in pre-war years.

In September 1939 for example, there were 37,500 men over 40 years of age in employment; in September 1945 the number had risen to 45,000; in September 1946 it was 48,000. In September 1939, the number of women over 40 years of age in the industry was 26,400; in June 1942 it had increased to 30,409. There has since been some reduction in the numbers in this age group, but it is quite possible that they are still above the level of 1939. This means that, whereas the percentages at that time for men and women were 39 per cent and 21 per cent respectively, they are now 58 per cent and perhaps as much as 31 per cent respectively.

In April 1946 there were about 8,800 workers of pensionable age in the industry. Some of these workers are likely to retire when the new pensions come into force.

4. THE SHORTAGE IN EACH SECTION OF THE INDUSTRY

FIGURES are given in Table 32 to show the change in employment in each of the main sections of the industry compared with July 1939, and September 1945.

TABLE 32

ANALYSIS OF CHANGES IN PRODUCTIVE WORKERS[1]

Numbers

	Combing	Worsted Spinning	Worsted Weaving	Woollen Spinning	Woollen Weaving	Total Previous 5 Cols.	Grand Total (Balance estimated)
1939 July ..	13,000	51,000	40,000	26,000	53,000	183,000	192,000
1945 Sept. 28 ..	7,500	32,000	25,000	17,000	34,000	115,500	121,192
1946 Jan. 5 ..	8,424	34,244	25,779	17,836	35,099	121,382	127,364
1946 April 12 ..	9,533	36,147	26,446	19,178	36,676	127,980	134,287
1946 May 10 ..	9,806	37,168	26,763	19,695	37,283	130,715	137,157
1946 Sept. 27 ..	10,700	37,600	26,900	19,600	38,400	133,200	140,826*
1946 Nov. 22 ..	11,181†	40,183‡	27,275	20,330	39,001	137,970	145,900

* Actual census figure.
† Figure for Nov. 1. ‡ Includes part time workers on evening shifts.

INDEX NUMBERS (*a*) ON JULY 1939; (*b*) ON SEPT. 1945.

	Combing (*a*)	(*b*)	Worsted Spinning (*a*)	(*b*)	Worsted Weaving (*a*)	(*b*)	Woollen Spinning (*a*)	(*b*)	Woollen Weaving (*a*)	(*b*)	Grand Total (*a*)	(*b*)
1939 July ..	100.0	—	100.0	—	100.0	—	100.0	—	100.0	—	100.0	—
1945 Sept. 28	57.7	100.0	62.7	100.0	62.5	100.0	65.4	100.0	64.2	100.0	63.1	100.0
1946 Jan. 5 ..	64.8	112.3	67.1	107.0	64.4	103.1	68.6	104.9	66.2	103.2	66.3	105.1
1946 April 12	73.3	127.1	70.9	113.0	66.1	105.8	73.8	112.8	69.2	107.9	69.9	110.8
1946 May 10	75.4	130.7	72.9	116.2	66.9	107.1	75.8	115.9	70.3	109.7	71.4	113.2
1946 Sept. 27	82.3	142.7	73.7	117.5	67.3	107.6	75.4	115.3	72.5	113.0	73.3	116.2
1946 Nov. 22	86.0	149.1	78.8	125.6	68.2	109.1	78.2	119.6	73.6	114.7	76.0	120.4

[1] The division between the various sections must be regarded as a rough approximation.

Source: Wool Control

The largest reduction in comparison with 1939 was in worsted weaving, followed by woollen weaving and worsted spinning. In combing and woollen spinning the reduction was less than the average.

Since September 1945, combing has registered much the most rapid rate of improvement, due perhaps to its greater dependence on men, and to the higher proportion of demobilised workers who have returned.

These changes, however, do not altogether bring out the degrees of shortage which are now being experienced. A better indication of this is the number of vacancies reported to the Ministry of Labour by employers. These are much larger in spinning than in other sections of the industry, and account for about half of the total number of outstanding vacancies. This is partly because the demand for yarn for export and for the hosiery trade makes it necessary to expand the output of intermediate products more rapidly than that of finished cloth.

5. THE SHORTAGE BY DISTRICTS

IT is difficult to measure the shortage of workers by districts except in relation to pre-war employment. Assuming, however, that something like the pre-war pattern of employment is restored, Table 33 compares the number of workers in each of the main districts in 1939 with the number employed in 1945. Figures are also given for 1924 in order to show the trend in pre-war years.

TABLE 33

NUMBERS INSURED IN THE WOOLLEN AND WORSTED INDUSTRY[1]

1924–45

(000's)

	East and West Riding	North Midlands	South Western	North Western	Scotland	Other	Total
1924 ..	209.5	7.1	7.9	12.3	20.4	3.3	260.5
1930 ..	194.8	5.8	7.4	10.9	18.0	2.4	239.3
1933 ..	186.6	6.0	7.2	11.1	17.0	2.1	230.0
1935 ..	191.8	6.2	7.3	11.7	17.8	2.2	237.0
1939 ..	184.5	5.8	6.8	11.3	16.5	1.6	226.5
1944 ..	101.6	3.4	3.3	6.6	9.5	1.8	126.2
1945 ..	101.7	3.1	3.2	6.6	10.5	1.6	126.7
1946 ..	114.8	3.0	3.8	7.4	12.9	4.6	146.5

[1] The ages covered are as shown in Table 28 above.

Source : Ministry of Labour

Of all the districts the South West suffered most heavily through the withdrawal of labour during the war, the numbers engaged in the industry falling from 6,800 in 1939 to 3,800 in 1946. In the other main centres of the industry, the loss over the war years was close to the general average of 35 per cent.

Two changes within the main districts of the West Riding since 1930 are shown in Table 34.. Up to the war, there was an increasing number of workers in Halifax, Huddersfield and Guiseley and a diminishing number in the other districts. The fall was particularly heavy in Dewsbury, Leeds and Bradford. In 1945 all districts had lost heavily in comparison with 1939, but Dewsbury had retained a rather higher proportion of workers than the others, as the average age of workers in the Dewsbury trade was greater and " concentration " less severe. Every district will obviously have an uphill struggle to attract more labour before there is sufficient to meet even the minimum requirements of the industry.

TABLE 34

NUMBERS INSURED IN THE WOOLLEN AND WORSTED INDUSTRY IN THE WEST RIDING DISTRICTS[1]

1930–45

	1930	1935	1939	1945
Bradford	63,334	61,242	57,973	29,414
Halifax	18,422	20,696	20,315	10,703
Guiseley	2,058	3,322	3,453	1,657
Huddersfield	34,331	34,460	35,109	20,312
Keighley	14,591	14,254	13,014	6,371
Leeds, Armley, etc.	27,583	25,436	23,566	13,131
Wakefield	5,407	5,343	5,117	3,096
Dewsbury, Batley, etc. ..	28,379	25,652	24,950	16,506
GRAND TOTAL ..	194,800	191,840	184,920	101,340

[1] The ages covered at the various dates are as shown in Table 28 above.

Source : Ministry of Labour

CONCLUSIONS AND RECOMMENDATIONS

PLANS should be based on the assumption of a continuing shortage of women workers as compared with the number employed in pre-war years. (*Page* 49).

The shortage of juveniles is likely to become still more acute. (*Page* 50.)

The numbers in the older age groups are high. (*Page* 51.)

The South West suffered most heavily through the withdrawal of labour during the war. (*Page* 52.)

Every district will have an uphill struggle to attract more labour before there is sufficient to meet even the minimum requirements of the industry. (*Page* 52.)

CHAPTER VI. THE RECRUITMENT OF LABOUR

THE future of the wool textile industry will be governed by its success in recruiting and employing labour on the scale necessary to meet the demands upon it. Any planning for its future, therefore, must be based upon a clear objective as to the eventual man-power that the industry requires, and a clear conception of the conditions under which that man-power can be recruited and continuously employed efficiently.

In Chapter III we suggested that the future volume of production required from the industry could not be predicted with confidence, but was likely to be of the order of 10–15 per cent higher than before the war. It is obvious that even on the most optimistic hypothesis it would be impossible to recruit within a year or two sufficient labour to bring the number of workers in the industry to a level 10–15 per cent higher than before the war. It is also apparent that it would be unnecessary to do so, since there is scope for a variety of measures of labour economy that should expand output per head, increase the total volume of production, and, by increasing earnings, attract more workers to the industry.

In our view, the utmost that can be hoped for within measurable distance in time is an increase in employment to 200,000. This would mean a labour

force about 15 per cent lower than was attached to the industry in pre-war years. On the other hand, there was some unemployment during those years that can no longer be afforded. Once this is taken into account, the reduction in employment postulated in the primary target we suggest, is of the order of 10 per cent. Taken in conjunction with an expansion in demand by 10–15 per cent it will be necessary to plan for an improvement in productivity of 20–25 per cent over the next few years.

FULL EMPLOYMENT AS A COMMON OBJECTIVE.

THE first necessity for the future health of the industry is a common objective clearly understood and loyally and enthusiastically pursued by both employers and operatives and their respective associations and unions. We are agreed that this objective should be the full and efficient employment of 200,000 workers under fair wages and conditions, comparable with those obtaining generally in other industries. We see no reasons to doubt that this number could be employed at the level of demand that will have to be met; the number is not beyond the limit that an energetic recruitment campaign might succeed in attracting to the indusrty; and it will still leave a condition of labour shortage that will call for extensive mechanisation and continuous effort by employers and employed alike to increase the output of the industry.

Given acceptance of this objective as part of the Government's general objective of full employment, we do not regard an improvement in productivity of the degree we have suggested as impossible though it would be obtained only by ingenuity, foresight and determination. It would involve the fullest possible adoption of measures of improved efficiency alike in the sphere of management and of equipment, on the part of the employers—measures which are discussed in the ensuing chapters of this Report—and of regular attendance and assiduity on the part of the workers.

The worker will naturally expect employment on terms not less favourable than in other industries; employers will equally expect the skill and effort applied to be comparable with the standard elsewhere. We shall discuss presently the conditions under which work is done, and how working conditions can be brought up to modern standards. We think it right that attention should also be directed to the work done under those conditions, and to the ways in which the workers can contribute to an expansion in output.

(i) *Absenteeism*

In the first place, it is important that absenteeism in the industry should be reduced to a minimum and avoidable absenteeism eliminated. We have no figures by which to measure the precise amount of absenteeism in comparison with pre-war years. Nevertheless in present conditions it is urgent that output should not be lost from avoidable absenteeism, since it is an important contributory factor in the shortage of yarn and cloth both for export and to meet domestic needs. This view has already been endorsed by both sides of the industry in a printed appeal to the workers issued in June 1946.

(ii) *The Work-load*

Secondly, it should be possible to settle one way or the other the complaints that are frequently made that the work load in various sections of the industry, notably weaving, compares unfavourably with that undertaken in other industries

and unfavourably (under equal conditions) with that undertaken in other countries. It is important that the facts should be fully investigated, and that, if it proves that an increase in the load on the average worker could be made without fatigue, this should be suitably brought home. If, on the other hand, the comparisons that are made are unfair or inaccurate, the public should be reassured on this point. It is important that if as the result of this investigation the worker undertakes extra work or responsibility beyond that to which he or she has been accustomed hitherto, appropriate adjustments in earnings should be negotiated.

There appears also to be little systematic study of the operations performed in the industry, either through motion-study, or otherwise, with the object of reducing fatigue and improving output without undue exertion on the part of the worker, or eliminating unnecessary operations. We draw attention in Appendix I to some interesting photographic research in Sweden into the time wasted in mending small defects in cloth without any gain in quality or serviceability. Research of this type seems to us valuable and necessary.

Elimination of avoidable absenteeism is essential in any event; absenteeism is a thing the country cannot afford. Changes in the work-load fall in rather a different category. What we suggest should be ascertained is firstly whether, with reasonable but not more than reasonable exertion, workers in particular jobs may properly be asked to give a greater output; secondly, whether by scientific modification of methods or customs, the same degree of exertion could produce a greater result. An extension of payment by results, including individual and collective piece work, should provide a greater incentive to effort. We are not concerned with any degree of exertion beyond what is reasonable in the circumstances. Nevertheless, workers in the industry might easily misinterpret the objective unless they felt assured that at the same time the efficiency of the industry was being overhauled in other directions also. It is because in later sections of this Report we refer to numerous matters in which improvements in working conditions, in management, in equipment, and in other respects can be effected, and in the faith that our recommendations in these matters will receive due consideration; that we put forward the present proposal.

HOURS OF WORK AND DOUBLE SHIFTS

THE normal hours of work in the industry were reduced from 55½ to 48 in 1919, and have recently been the subject of a further reduction to 45.

It is not within our terms of reference to make recommendations in regard to possible or further changes. So far as these do occur, however, they will tend initially to reduce output per head, and, therefore to aggravate the shortage of manpower.

Changes in hours of work are closely associated with the problem of shift working. Day and night shifts exist in wool combing and woollen spinning, and, to a limited extent, in worsted mule spinning and automatic weaving. In view of the shortage of labour we do not anticipate an immediate extension in the shift system, except as a natural concomitant to the increased use of automatic looms. It is also possible that some sections of the industry, faced with the need to employ men on work formerly undertaken by women, may elect to work a night shift, and so offset the extra wage cost by a saving in overhead expenses.

MEASURES DESIGNED TO IMPROVE THE ATTRACTIVENESS OF THE INDUSTRY

1. WAGES AND EARNINGS

IT is not within our terms of reference to comment on matters that are normally the subject of negotiations between Employers' Associations and Trade Unions. A wage-increase has recently been negotiated through the appropriate channels.

2. WORKING CONDITIONS

THE working conditions in the industry vary greatly. There are some factories where conditions compare favourably with those of the most modern factories in other industries, and some where conditions are very bad. The main improvements that seem necessary are in the re-spacing of machinery, lighting, temperature, ventilation and humidity, noise, and washing accommodation. There is also room for improvement in the provision of canteens, clothes-drying facilities, welfare supervision, decoration, etc.

Asked for a description of the best and worst conditions the Factory Inspectors submitted the following evidence, which in general we endorse :

> " The best conditions are provided by light, well-ventilated sheds, decorated in pleasing colours with well-spaced machinery, with good modern lighting throughout, individual clothing lockers, modern washing accommodation, good canteen, adequate welfare supervision, and a training school for new entrants.
>
> " The worst conditions are found in old mills having low tops and narrow passages with badly spaced machinery, poor lighting, primitive washing accommodation, with no warm water, soap or towel, floors caked with accumulations of oil and waste, excessive " fly " in the air, heavy fumes from rag-grinding, and no provision for taking meals."

The improvement of conditions of work in the industry is already the subject of discussion by a wool textile Joint Factory Committee, instituted at the request of the Chief Inspector of Factories some 18 months ago. The following are the terms of reference of this Committee, which includes representatives of employers, workers and Government departments,

> " To enquire into and report on the most effective methods of compliance with certain requirements of the Factories Act, 1937, and other related problems in the Wool Textile Industry, as follows :
>
> (*a*) Maintenance of a better standard of cleanliness and decoration in the mills.
>
> (*b*) Ventilation, temperature and general atmosphere condition in work-rooms, with particular reference to securing and maintaining a reasonable temperature in certain processes.
>
> (*c*) Lighting.
>
> (*d*) Fencing of machinery, including revision of the 1936 Agreement and necessary additions, amendments, and deletions consequent thereon.
>
> (*e*) Arrangement and spacing of machinery to ensure adequate safety and welfare conditions.
>
> (*f*) Training of Young Persons on machines.
>
> (*g*) Provision of Welfare Amenities (including sanitary accommodation, washing facilities and clothing accommodation): Medical and Welfare Services."

The Committee is making steady progress and an interim report on the spacing of machinery is under consideration. Conclusions on general cleanliness, decoration and lighting have already been agreed upon. The recommendations of the Committee will not, of course, be binding upon the industry except insofar as they may be the subject of existing or further legislation. A real improvement in conditions is not easily accomplished through the setting of standards by legislation, but must be the product of the initiative of employers after consultation with the trade unions, to whose views the greatest attention should be paid. Many employers in the industry provide working conditions well in advance of any legislative requirements.

In the East and West Ridings alone there are 1,850 wool textile factories, of which we have ourselves seen only a few. Any impressions which we record, therefore, are intended to be tentative, and an indication of the conditions that have specially attracted our attention. Moreover as regards several of the headings which we deal with immediately below, conclusions of the Joint Factory Committee will become available in due course. So far as we have been able to judge, the conditions in the best mills are comparable with the best in any other country; and what is most required is emulation of standards that are already achieved in the industry rather than the pursuit of ideal conditions of which no examples yet exist. In the West Riding, although not in other districts, the industry is handicapped by surroundings that are both dirty and dreary and by housing conditions that are quite inadequate by modern standards.

(a) *Spacing of Machinery*

In many factories machinery is in need of re-spacing. This results partly from the growth in the size of the machinery, and from the disposition in the 19th century to crowd the maximum number of machines into a given space. Re-spacing has been going on gradually but more rapidly in recent months. Some firms that were closed down during the war through the concentration of the industry have made use of the opportunity to re-space their machinery before re-opening.

The existing buildings in the industry are not always such as to permit of easy re-spacing. We return to this point in Chapter VIII.

(b) *Lighting*

A great advance has been made in recent years in the standard of lighting in industry generally. This advance has naturally been greatest in war-expanded industries which have been able to put up new factories or extensions or to re-organise their existing layout. In the wool textile industry there has been an improvement in quite a number of mills, and many have introduced good modern lighting at considerable expense. There are still some mills, however, where lighting is bad and puts an unnecessary strain on the eyesight of the workers. The lower floors in some factories work almost entirely with artificial light, including gas. An extreme example has even been quoted to us of a firm using the old fishtail burner, but this factory has since introduced fluorescent lighting. We do not wish to imply that fluorescent lighting is necessarily ideal, or that the standard of lighting in the industry is abnormally low, or that natural lighting is the exception; for none of these statements would be true. We have had evidence that there is general anxiety to improve the standard of lighting, and there is certainly room for improvement.

Good lighting (and especially fluorescent lighting) generally requires some experimentation before a suitable system and lay-out can be selected. Apart

from arrangements for the greatest possible admission of daylight, and for a sufficient intensity of artificial light, care has to be taken to eliminate glare and to provide for a reasonable brightness of walls, ceilings and machines. The use of colour and of light are to some extent interdependent and a good lighting and colour scheme can add greatly to the amenities of the mills.

(c) *Temperature, Ventilation and Humidity*

There have always been complaints in the industry of extremes of temperature; either very low temperatures, especially on Monday mornings; or very high temperatures, especially where steam is used for processing or where machinery has to be heated. Low temperatures, which have been the cause of stoppages in the industry, have frequently been due in war-time to the shortage of fuel; on Monday mornings they may be accounted for by difficulty in getting the boilers going and by the time taken for the factory to warm up. There can be no doubt that it has always been bad economy for an employer to allow the temperatures to fall below a reasonable level, since this is bound to prevent the workers from giving of their best. High temperatures, which may be up to 80–90° F. at certain times of the year are most common in the wool combing section of the industry, where they are liable to cause considerable discomfort and are partly due to the use of heat in drying processes and to the need to keep cards and combs heated. The most effective preventive measure and the one most commonly used is the lagging of steam pipes and hot surfaces. A partial remedy is good ventilation, which does not necessarily reduce the temperature but does reduce humidity and makes conditions more bearable. We understand that the Joint Factory Committee are examining the technical aspects of the problem and recommend that further research should be undertaken.

Good ventilation is particularly necessary in dyeing and finishing, and in rag-grinding. In dyeing and finishing, the worst conditions tend to be in the smaller dyehouses although some have conditions comparable with the best. It is possible to find dyehouses where visibility in certain conditions is no more than a few yards; on the other hand in an up-to-date dyehouse visibility is as satisfactory as in many other types of factory. In rag-grinding the air tends to be full of fumes, due to the volatilisation of the oil in the rags; but this can be dealt with by exhaust ventilation. There is also, with rags of certain types, a large amount of dust in the air thrown out by the tearing of the rags; this too can be dealt with if the rags are treated before grinding. It is comparatively easy to prevent dust and fumes from entering the workrooms. Nevertheless the establishment of a central cleansing depot for the treatment of rags before they go to woollen mills seems to us to call for further examination.

Associated with the high temperatures in dyeing and finishing is the great atmospheric humidity common in those sections of the industry. This is greatest on sunless days, when the steam hangs in the factory without rapid evaporation. The remedy lies in the proper design of buildings and the enclosure of dyeing vessels as well as in improved ventilation. We were particularly impressed in Sweden and Switzerland by the absence of excessive humidity in the dye-houses.

(d) *Noise*

The industry is known as a noisy one, although noise is not one of the most frequent complaints against it. Some sections, such as wool combing and weaving, are noisier than others, but in nearly all types of mill it is difficult to carry on conversation without effort near running machinery. Noise is

bound to be responsible for some industrial fatigue, and it is obviously desirable that it should be reduced as much as possible both by diminishing the noise coming from the machine itself and by arrangements to absorb the balance. We suggest that this is a subject on which research might usefully be undertaken, especially as there is a quite considerable difference even between factories engaged in the same processes.

(e) *Individual Electric Drive*

Electrification of the mills with individual drive tends to improve the general working conditions by permitting the removal of overhead shafting, admitting more light, and reducing noise. It also improves the general appearance of the factory, and facilitates decoration and the better use of colour. These reasons though not of themselves sufficient to justify a change, should turn the scale when other conditions are not definitely adverse. For there can be no doubt that part of the reluctance of workers to enter the industry is due to the general impression left upon them by the contrast in appearance between the belting and shafting of a textile mill and the roomier appearance of a modern engineering establishment. It should also not be lost sight of that the attitude of the average worker is affected by his sense of the anxiety of the management to keep up with the latest technical standards, and his identification of such standards with the extensive use of electricity.

(f) *Washing accommodation and clothes drying facilities*

For persons employed in certain work, Factory Act Regulations require at least one wash basin for every 5 persons, but generally speaking the Act does not specify any precise standard. There has also to be an easily accessible supply of drinking water. Many mills provide good facilities, but washing accommodation is a frequent subject of complaint by the workers.

The general statutory requirement to provide adequate and suitable washing accommodation was introduced only in 1938, and many mills have not yet been able to make the arrangements they wish. There is room for improvement in lavatory accommodation, and this, too, is going ahead, although in present conditions progress cannot be rapid. The provision of facilities for hanging and drying clothes is also inadequate.

Rest Rooms.—Consideration should be given to the further provision of rest rooms which are already provided in various mills.

(g) *Canteens*

Of the factories in Yorkshire, 372 provide canteens giving a full meal service; of these factories, 109 employ more than 250 persons. The Ministry of Labour have powers to direct that a canteen be established by factories employing over 250 persons and, in certain circumstances, by smaller factories also; but most factory canteens have come into existence without such a direction. In addition, 155 factories are known to provide mess-rooms with facilities for heating food and boiling water, but full records are not available, and the actual number with such facilities is probably much larger. A supply of boiling water for making tea exists in practically every mill, large or small, and arrangements for supplying tea are made in a large and increasing number of mills.

We suggest that there is need for small firms, both when housed together in what are known as company mills and when closely adjacent to each other, to take joint action to set up canteens. Such firms may also find it possible to co-operate in other directions to improve welfare services and medical facilities.

(h) *Occupational Diseases*

We have no evidence of occupational diseases in the industry, apart from anthrax, which is now very rare. Dermatitis is a possible exception, and is more commonly reported from those parts of mills where dyeing and finishing processes are carried on, than from any other section. Dermatitis is not a compulsorily notifiable disease and completely reliable statistics are not available. Factory Inspectors informed us that an increasing number of cases are notified to the Department from industry generally and that the Chief Inspector had circularised all factories stressing the importance of good washing accommodation to prevent dermatitis.

So far as the wool industry is concerned, the Employers' Council stated that in the only area in which an enquiry had been made, there had been no change in the incidence of dermatitis during the six years of war and that only 4½ per cent of the industrial claims allowed were for dermatitis. This implies an incidence of less than 0.1 per cent of the total number of workers or, say, 150 cases per annum. We were given somewhat conflicting evidence on the efforts made by firms in the industry to carry out Factory Department recommendations, such as the display of posters, the provision of barrier creams, and so on. We suggest that fuller information on dermatitis in the industry is necessary. An enquiry specially directed to this point could show the percentage incidence in those sections of the industry in which the disease is most apt to occur and the parts of the body usually affected. This enquiry might throw up information showing the desirability of making dermatitis a compulsorily notifiable disease. There should also be fuller compliance with Factory Department recommendations.

(i) *Weight Lifting and Weight Carrying*

Regulations under the Factories Act (S.R.O. 1926 No. 1463) prescribe for the industry various weights as maxima to be lifted by men, women, boys and girls respectively in certain circumstances. They contain no provision as to the amount of weight that can be carried, as distinct from lifting. We suggest that consideration should be given to regulations limiting the carrying of heavy weights. It is also important that use should be made wherever possible of mechanical methods of handling. Apart from reducing the strain of moving heavy weights, such methods would contribute to an economy in labour; and in most sections of the industry mechanical handling could undoubtedly be used much more extensively on ordinary commercial grounds.

(j) *Day Nurseries*

If is is hoped to attract married women with children to the industry the use of crêches and day nurseries should be encouraged. Some factories already provide these, and by co-operative action and the assistance of the local authorities their use might be continued or expanded, in the interests of the industry, from the arrangements made during the war.

RECRUITMENT, EDUCATION AND TRAINING OF ENTRANTS INTO THE INDUSTRY

FOLLOWING a meeting held nearly two years ago at which representatives of employers and workers in the Wool Textile industry went to meet representatives of the Ministry of Labour and other Government departments the

suggestion emerged that the industry should undertake joint consideration of schemes for the recruitment and training of juveniles but this matter has not yet been jointly taken in hand. Recently the Employers' Council and the Trade Unions have agreed to set up a Joint Committee of eight representatives each under a chairman to go into the question of the recruitment, education and training of operatives generally. These two matters, though they have points of contact, are in other respects distinct. The training of juveniles is a continuing matter. The recruitment and training of older entrants is a pressing problem of the moment, when a general recruitment drive is required, but will become of decreasing urgency as time goes on. Because of the points of contact the initial work on both heads should progress as far as possible simultaneously.

Whatever are the general objectives to be aimed at—and on this we add certain observations—they will need to be carefully fitted in to the circumstances of a highly specialised industry. We wish therefore strongly to recommend that a Joint Committee to consider juvenile recruitment, education and training, should be set up and get to work with the least possible delay, and that the other Committee should similarly get to work at once. This would be in general accordance with the report presented to the Minister of Labour in December 1945, by the Joint Consultative Committee of the British Employers' Confederation and the Trades Union Congress on Recruitment and Training under the title of "Recruitment and Training of Juveniles for Industry." The similarity of the subjects to be examined by the two Committees suggests that some element of common membership would be very desirable.

On a long view the recruitment, education and training of juveniles is of special importance since at least 80 per cent of those who enter the industry normally do so as juveniles. So far as concerns the first preparation of the child's mind for the change from school to work, the growth in his mind of an understanding of the general surroundings of his future life, and the choice of a career, we would especially refer to the publication by the Ministry of Labour (H.M. Stationery Office, 1945) "Report of the Committee on the Juvenile Employment Service." Action should begin in the schools, where it should be undertaken in close association with the Juvenile Employment Service of the Ministry of Labour. There is at present too little effort to bring home to the children how great a part wool plays in the livelihood of their districts, how important the wool industry is to the country at large, and how much it lies in their power to make it an even greater source of civic pride. A few talks might be given to children (and to their parents who might well be encouraged to come and listen to talks of this kind) by speakers with first hand knowledge of the various sections of the industry and films might be shown such as one which has been recently prepared by the Employers' Council to show the processes and products of the industry. In this way there would arise a greater awareness and appreciation of the industry which might not only help towards solving the recruitment problem but would also be very valuable when the time came for the children to take their first steps in actual training for a textile career.

For a period after entry into the industry there will be opportunities for the new recruit to continue a general education. These opportunities and also those for vocational instruction may be expected to become wider and more general as the new Education Scheme develops.

So far as concerns training in the factory, our observations must be very general, for in an industry such as this detail needs to be worked out and become

the subject of joint agreement. Subject however to necessary exceptions in apprenticeship cases we feel that it is well within the capacity of young people today to become proficient in more than one branch of the wool industry and that if practical training on the job to which a new entrant is assigned is followed by some training on other jobs it would both add to the interest of the occupation and help to break down an over-rigid sectionalisation which at present tends to restrict the best use of talents and labour. Though the proper balance between the supply of, and the demands for, labour in an industry with so many steps as are involved in the making of fabrics from wool is far from simple, we hardly think there is any unavoidable reason why there should at times be too many available workers in one section side by side with a shortage in another. We think also that training in the workshop should so far as possible be contrived as to appear in natural sequence to any previous training that the entrant may have acquired. To the extent that practical training is given in groups it is very desirable that the members of the group should all be at the same stage and that wearisome repetition for some members of the group should thus be avoided.

We call especial attention also to the Ministry of Labour scheme known as Training within the Industry for Supervisors, which latter term is intended to include all those in an organisation who have the responsibility of directing the work of others. One of the objects of this scheme is to assist supervisors in developing the art of instructing new entrants in their functions. The use of this scheme in the wool textile industry should be extended.

These observations have been directed primarily to the training of juvenile entrants to the industry. At the present time the training of those who enter the industry at an adult age is also of importance and urgency. It is however only necessary to say that suitable arrangements for training juvenile entrants within the industry are generally suitable also for adults with little modification save that resulting from the older age and greater general experience of the new entrant.

LOCATION OF THE INDUSTRY

IN view of the shortage of labour there is a natural disposition for firms to consider moving to other districts. Some important changes are already in progress. Among the places to which dispersal or transfer is taking place are Darlington, Belfast, Rotherham, and Uddingston in Lanarkshire.

We have considered this trend towards new locations in relation both to the shortage of labour in the wool textile industry and to the general man-power requirements of the country. We appreciate that it will be more than ever essential to mobilise man-power that before the war did not find employment, and that this is likely to involve the location in areas where there were previously inadequate opportunities for women to find employment of factories and industries in which the normal proportion of women workers is relatively high. For this reason, we do not think it contrary to the general interests of the country that some textile mills should seek to establish themselves in mining areas such as those in South Yorkshire, where there is likely to be a residue of female labour that can be drawn upon and a reasonable prospect that the industry can be carried on with success.

We single out South Yorkshire both because it is relatively near the most important established centre of the industry, and because it lies in the direction of the North Midland area, which is the largest market for hosiery yarns. The

Ministry of Labour have submitted evidence of the probable surplus of women, and have stated that they would welcome further diversification of industry, in those districts. Whilst we do not wish to exaggerate the probable surplus, since it is easy to under-estimate the calls that are made upon the time of a miner's family, we see no reason to doubt that labour could be found to bring into production in those districts machinery which is at present idle in the West Riding.

The possibility of further dispersal varies between different sections of the industry. It is easier for firms organised on a vertical basis to move than for firms specialising in the production of intermediate products, and closely interlocked with other firms either as customer or source of supply. An attempt to move wool combing would be both expensive and protracted; some woollen manufacture, on the other hand, might move without undue inconvenience.

The existing pattern of location has come into existence over a long period of time, and has shown little disposition to change. There are strong social and economic forces tending to perpetuate it, and any firm moving to a fresh location runs a serious risk. In particular, it must divorce itself, to some extent, from the wide range of facilities that has grown up in areas like the West Riding to cater for the specialised requirements of the industry. In addition, any movement to other centres would involve a process of re-building, not only of factories and market connections, but also of the traditions and skills that go to make up the most important advantage possessed by the existing centres of the industry.

For this reason, the first objective, in our view, should be to expand output in the existing centres. If events show that the labour force available will be unable to meet the whole normal demand, there will be room for a further limited dispersal beyond what is already in progress. This dispersal, whether it takes the form of a movement by existing firms or the entry of new firms, should be primarily to areas where there are prospects of an early surplus of women workers, and where a nucleus of workers familiar with the industry could easily be assembled. So far as voluntary dispersal of this character may ultimately prove inadequate, it is premature to try to lay down a solution now, but concerted study may become necessary later on.

We have had evidence submitted to us on behalf of the Welsh Textile Industry suggesting that there is scope for the expansion of twelve of the more enterprising concerns located there. The Welsh textile manufacturers do not form a large proportion of the whole of the industry as they employ only about 500 workers in 74 firms. It is obvious, therefore, that even a large expansion in Wales would not greatly affect the general location of the industry. We do not think that the proposals put before us, involving a great deal of Government assistance and direction, are particularly well conceived but we suggest that it may be possible for some dispersal to take place to Wales from other centres in the industry in which the shortage of labour is acute.

DIVERSIFICATION

ALTHOUGH diversification is, to some extent outside our terms of reference, it is capable of becoming so important to the whole textile industry that some reference to it is necessary.

We have suggested that it is desirable that the industry should remain concentrated in the areas in which it is now situated. Diversification, implying the displacement of some workers in the industry to alternative occupations, would

in proportion as it is vigorously pursued, defeat the object in view. In general, therefore, we see little reason to aggravate present shortages by an active policy of diversification.

From the point of view of national policy, however, there might be some advantage in introducing new industries in areas in which a single industry has hitherto been preponderant. Such a policy would tend to limit the risk of extensive and protracted unemployment.

We have made some enquiries with a view to discovering whether any districts heavily dependent upon the industry have suffered in the past with particular severity from unemployment.

In the heavy woollen districts, round Dewsbury and Batley, unemployment over the five years 1934–38 averaged 19 per cent, compared with the average over the same period of 11 per cent in Bradford, Halifax, Huddersfield and Keighley. This was partly due to a specific tariff imposed by Canada and affecting heavy low-priced clothing with special severity. Since the lower end of the trade would suffer if there were (as is likely) a progressive rise in the quality of cloth purchased by home consumers, there is a danger that the heavy woollen districts may again be affected by a loss of markets. Moreover, there should be more room in those districts for an addition to the volume of industrial employment, in comparison with pre-war years. We agree, therefore, that it would be of advantage to have a few alternative industries located in these districts.

CONCLUSIONS AND RECOMMENDATIONS

THE labour force that can be hoped for within measureable distance of time does not exceed 200,000,—a labour force 15 per cent lower than was attached to the industry pre-war though not then fully employed. Taken in conjunction with the probable volume of demand, this implies the necessity to plan for an improvement in productivity in the industry of 20–25 per cent over the next few years. (*Pages* 53 *and* 54.)

The first necessity for the industry is a common objective clearly understood and loyally pursued by employers and operatives and their respective associations and unions and this should be the full and efficient employment of 200,000 workers under fair wages and conditions. (*Page* 54.)

Given acceptance of this objective the necessary improvement of productivity, though it would be reached only by ingenuity, foresight and determination, is not unattainable. (*Page* 54.)

The industry cannot afford absenteeism if its objects are to be attained and avoidable absenteeism should be eliminated. (*Page* 54.)

Steps should be taken to settle one way or the other allegations frequently made that the work-load in various sections, notably weaving, compares unfavourably under equal conditions with other countries and unfavourably with other industries. (*Pages* 54 *and* 55.)

Research regarding the operations performed in the industry, having the object of reducing fatigue and improving output without undue exertion, should be pursued. (*Page* 55.)

Improvements in working conditions under one or more of the heads named below are required in many, but not in all, premises. Under several of the heads conclusions of the Wool Textile Joint Factory Committee will become available in due course. (*Pages* 56 *and* 57.)

Spacing of Machinery. (*Page* 57.)

Lighting. (*Page* 57.)
Temperature, Ventilation and Humidity. (*Page* 58.)
Noise (upon which research might usefully be undertaken). (*Page* 58.)
Individual Electric Drive. (*Page* 59.)
Washing and Clothes Drying facilities. (*Page* 59.)
Rest Rooms. (*Page* 59.)

The establishment of a central cleansing depot for the treatment of rags calls for further examination. (*Page* 58.)

There is need for small firms, both when housed together and also when closely adjacent, to take joint action to set up canteens and to co-operate in other directions to improve welfare services and medical facilities. (*Page* 59.)

Fuller information on dermatitis in the industry is necessary, and fuller compliance with Factory Department recommendations. (*Page* 60.)

Consideration should be given to weight lifting and weight carrying limitations. Use should also be made whenever possible of mechanical methods of handling. (*Page* 60.)

If it is hoped to attract women with children to the industry the use of day nurseries, with the co-operation of the local authorities, should be encouraged. (*Page* 60.)

Arrangements for the recruitment and training of operatives should be improved in various ways. Two joint committees to consider separate aspects of this matter should get to work at once. (*Pages* 61 *and* 62.)

While the first objective should be to expend output in the existing centres of the industry, yet if events show that the labour force available will be unable to meet the whole normal demand there will be room for a further limited dispersal to other districts (including South Yorkshire and also in a measure Wales) beyond what is already in progress. So far as voluntary dispersal may ultimately prove inadequate, concerted study may become necessary later on. (*Page* 63.)

There is little ground for diversification of industry in the wool textile centres except that a few alternative industries might be located in the heavy woollen districts of Yorkshire. (*Page* 64.)

CHAPTER VII. PRODUCTIVE EFFICIENCY

THE shortage of labour makes it more than ever necessary to adopt any possible expedients to increase ouput per head in the industry. Even if labour were plentiful it would still be necessary to raise efficiency to the highest pitch in order to win foreign markets, compete effectively against the competition of imported cloth, and secure good wages and conditions of work.

Efficiency is most readily measured on a comparative basis: by comparison with other countries and other industries, or in relation to the possible economies that firms of a particular size or structure can be shown to enjoy.

I. COMPARISON WITH OTHER COUNTRIES

BEFORE the war, in men's wear at any rate, the United Kingdom led the world both in style and quality, and the standard on the Continent and in the United States was set by British products. High tariffs were necessary in order to enable domestic industries to preserve the home market from imports of British cloth, for which there was still such a preference that imports could not entirely be shut out. This in itself suggests that in the manufacture of high

quality cloth the British industry was highly efficient in comparison with other countries.

We have not been able to obtain information on output per man hour or per machine hour in any section of the British wool textile industry, although we attach great importance to the collection of information of this kind. Nor have we been able to obtain comparable data for other countries.

We have made a rough comparison in Tables 35 and 36 of the output of woven fabric per wage-earner employed and the output of yarn and cloth per machine installed in the United Kingdom and the United States. This comparison must be made with due qualifications. In the first place the figures are not available on the same basis throughout and at certain points, therefore, are not strictly comparable. Secondly, the comparison is entirely in physical terms and makes no allowance for differences in the quality of the final product although it is known that the cloth produced in the United Kingdom was, on the average, of better quality than the cloth produced in the United States. Thirdly, the method of comparison makes it impossible to take account of the large output of intermediate products in the United Kingdom that is exported without being turned into cloth. This of itself would be sufficient to account for an apparent difference in productivity between the two countries of about 10 per cent. Finally no allowance is made for the higher proportion of men employed in the United States, although this is likely to have told in favour of a higher output per head in that country. In 1939 59 per cent of the workers in the wool textile industry in the United States were men while 59 per cent of the workers in the United Kingdom were women.

It must also be remembered that the average value per pound of cloth, which can be taken as an indication of cost of production, was $1.33 in the United States in 1939 and $0.89 in the United Kingdom in 1937, so that American cloth is not only of inferior quality but more expensive to manufacture. The difference in cost is obviously not un-connected with the much higher rate of hourly earnings in the United States. In the average weight per square yard of the cloth produced in the two countries there was no significant difference in pre-war years : in both it was about 10½ oz.

TABLE 35[1]

PRODUCTIVITY AND EARNINGS OF LABOUR IN THE UNITED KINGDOM AND THE UNITED STATES

	United Kingdom	United States
Output of woven fabrics (millions of linear yards)[2] ..	367	534
Approximate number of wage-earners (thousands)[3] ..	200	147
Output per wage-earner (linear yards)	1,835 (Jan. 1945)	3,633 (Jan. 1945)
Average hours worked per week	46.3	43.1
Average hourly earnings	$0.3	$0.86
Average weekly earnings	$13.7	$36.8

[1] These figures must be read in conjunction with the above qualifications. The figures for the United Kingdom relate to 1937 ; those for the United States to 1945 (they are based on experience in the first quarter of that year). These dates are selected so as to allow a comparison to be made in conditions of active trade in the two countries.

[2] Output includes apparel and non-apparel fabrics. The British figure is taken from the *Board of Trade Journal*, 18th May, 1946, pp. 611–2 ; the United States figure is taken from Table 14 in *Facts for Industry* issued monthly by the Bureau of the Census. The coverage is similar but not identical.

[3] The figure of employment in the United Kingdom is a rough estimate, excluding carpets and rugs, and administrative, technical and clerical staff.

TABLE 36

OUTPUT PER MACHINE IN THE UNITED KINGDOM AND THE UNITED STATES

	United Kindom (1937)	*United States* (1946)
Woollen and worsted spindles installed (millions)[1] ..	5·5	3·55
Output of yarn per annum (million lbs.)	566	900
Output per installed spindle per annum (lbs.) ..	103	253
Woollen and worsted looms installed (thousands)[2] ..	80	40
Output of woven fabrics per annum (millions of linear yards)	367	550
Output per loom per annum (thousand yards) ..	4.6	13.7

Sources : Census of Production and U.S. Census of Manufacture

[1] *Spindles :* Doubling spindles are omitted. It has not been possible to discover whether this is true also of the United States figure. Nor has it been possible to reduce the United States figure to mule equivalent spindles. In worsted spinning, where neither country used mule spindles extensively, the British output per spindle in 1937 was $\frac{241}{3.2}$ or 75 lbs. per spindle. In America it is currently about $\frac{280}{1.9}$ or 147 lbs. per spindle. Carpet yarns are included in all figures.

[2] *Looms :* The figures of cloth include blankets, which in terms of linear yards, formed 5 per cent of British output in 1937. The American figures include cloth woven on looms other than woollen and worsted looms but this is offset by the exclusion of woven fabrics containing less than 25 per cent wool fibre.

Subject to the above qualifications, Tables 35 and 36 are illuminating especially on two points. The first is the extraordinary contrast in average hourly earnings, which are nearly three times as great in the United States as in the United Kingdom. If we make allowances for the higher proportion of women employed in Britain, the difference, expressed in terms of hourly earnings per man, is rather less ; and when account is taken of the higher cost of living in the United States the difference is again reduced. Nevertheless the margin remains a very wide one after all adjustments have been made.

The second point that calls for comment is the high physical output per head achieved in the United States. In 1937 the wool textile industry produced at the rate of 1835 yards of woven fabric per wage-earner, in Britain and in the spring of 1945 at the rate of 3633 yards per wage-earner in the United States—nearly twice as much. As the hours worked were longer in Britain, the difference in output per man hour was still greater. An independent calculation, using a quite different method has been made by Mr. L. Rostas, who is attached to the National Institute of Social and Economic Research and has made a special study of the statistics of industrial productivity. Mr. Rostas' method gives a difference in output per operative between the two countries of 30–40 per cent in 1937 with a subsequent increase of 47 per cent in output per operative in the United States between 1937 and 1945 ; and a difference of 65–75 per cent in output per man-hour, with a subsequent increase in the United States of 22 per cent in the same period. These results agree very closely with those obtained by the method employed in Table 35.

This comparison, it must be repeated, is exclusively in physical terms : it does not necessarily reflect differences in efficiency. Other tests, taking full account of the quality of the goods produced, the skill with which raw material was selected and used, and so on, might conceivably show a balance in favour of Britain. The margin between the two countries is too wide, however, to make this altogether likely.

It will be observed that the comparison in Table 35 is between one year in the United Kingdom and a more recent period in the United States. The periods selected allow a comparison to be made in conditions of active trade in the two countries. Had some period in 1945 or 1946 been taken for both countries, the difference in favour of the United States would have been larger. Since 1937 a boom in textiles has carried American output and productivity to record levels while there has been no corresponding improvement in Britain. On the contrary, in the six winter months, September 1945–February 1946, output per head, measured on the rather crude basis of linear yards of cloth per insured worker, was probably slightly lower than in 1937, averaging about 1,700 yards compared with a rough estimate of 1,835 yards for 1937.

The contrast in output per head is apparent also in the figures of output per spindle and per loom given in Table 36; but for different reasons. In America the output of yarn per spindle is 2½ times as high and the output of cloth nearly 3 times as high as in Britain. This is due partly to the use of second and third shifts in the United States to a very much greater extent than in Britain, and partly to differences in productive methods. Of the looms in use in the United States, for example, over 70 per cent are automatic while the proportion in Britain is about 6 per cent.

No one would suggest that the wool textile industry in this country should be organised soley with a view to obtaining the maximum physical output either per head or per machine, since there could be no surer road to disaster. The British industry, and above all the British export trade, is heavily dependent upon its unequalled reputation for quality, and the manufacture of quality goods is necessarily rather expensive in labour. At the same time, so long as the home market requires to be rationed for cloth, and the prospects of expanding production to meet the full home and export demands show no sign of rapid improvement, there is much to be said for changes in technique that would increase output without serious repercussions on quality. It is also obvious that conditions of labour shortage, especially when they are most acute among women and juvenile workers, must tend to reproduce some of the circumstances that have given rise to the mass-production of low to medium quality cloths in the United States. From this point of view the contrast in Tables 35 and 36 is suggestive of the expansion in physical output that is possible by the adoption of American methods.

We have not attempted further comparisons between the British and foreign textile industries[1] but we recommend that such comparisons should be pursued, (though with due regard to the highly specialised products of the British industry), with the assistance of the Advisory Committee on Statistics referred to in Chapter XI.

2. COMPARISON WITH OTHER INDUSTRIES

ANY comparison of efficiency in the wool textile industry with efficiency elsewhere in British industry must depend largely on general impressions. We have formed a favourable view of the general level of efficiency and of the robustness of outlook and spirit of confidence with which manufacturers are framing their plans for the future. It is felt throughout the industry that in spite of the difficulties of the inter-war years, the depression in trade, and unemployment

[1] A comparison is possible between combing plants in Germany and Britain. A modern and efficient plant in this country has an output of top and noil per comb-hour 34 per cent greater than the average output per comb-hour in German mills.

and low wages, with which it had to deal, the products that the industry can make are still equal or superior to the best produced in other countries.

The only quantitative test of efficiency in comparison with other British industries that we have been able to apply is a rough and ready one afforded by the Census of Production statistics. Over the 11 years between 1924 and 1935 employment fell by 12 per cent. Output, however, did not fall although it is not easy to estimate the precise ratio in which it increased. The Census of Production for 1935 included an index showing an increase in the volume of output by 9 per cent. This index is not altogether satisfactory and undoubtedly exaggerates the net increase that took place. Calculations made by Mr. Rostas put the increase at 3 per cent, and if this estimate is accepted output per head in the industry must have risen by 17 per cent or 1½ per cent per annum. For British industry as a whole it is usual to accept an estimate for the progressive increase in output per head of about 1½ per cent per annum. On this basis, the wool textile industry would seem to have been near the average in the rate of progress recorded.

3. COMPARISONS BETWEEN FIRMS WITHIN THE INDUSTRY

THERE are, however, wide variations in efficiency between the different firms in the industry. The standard of the best is one well worthy of emulation and if generally achieved would of itself produce a marked improvement of output. Here, therefore, is a task on which the industry might well concentrate: to identify the best practice and bring it into general use. This would be the surest and quickest method of increasing the productive efficiency of the industry. For this purpose comparisons of cost would be invaluable and high priority should be given to arrangements for the collection and analysis of the necessary information.

TABLE 37

COMPARISON OF SPINNING AND CONVERSION COSTS

30 oz. 34 Pick Woollen Overcoating

HEAVY WOOLLEN DISTRICT (Average spinning and conversion costs, 36.45d.)

	Size	*Percentage variations from average*	*Percentage of Looms in use*
1	Fairly large	111	65
2	Medium	110	68
3	Small	106	80
4	Small	104	90
5	Medium	87	70
6	Very large	79	74[1]

[1] Automatic Looms.

COLNE VALLEY (Average spinning and conversion costs, 33.56d.)

	Size	*Percentage variations from average*	*Percentage of Looms in use*
1	Medium	115	90
2	Medium	109	64
3	Very small	103	74
4	Medium	103	77
5	Small	99	75
6	Small	95	75
7	Very large	94	70
8	Large	91	70
9	Medium	90	99

Source: Ministry of Supply (Costing Department.)

Our own efforts to obtain comparative information on costs of production in different districts, in firms organised vertically and horizontally, and in firms of different sizes have not been very successful. In view of the scarcity of data on these subjects, however, we reproduce two tables (Tables 37 and 38) illustrating the range of variation in costs in the heavy woollen trade and in worsted weaving. These tables are derived from information collected by the Ministry of Supply's Costing Department during the war, and are subject to three important reservations :

(*a*) They refer only to production on Government contracts.

(*b*) In war time manufacturers were not necessarily engaged on the type of work for which their plant was laid out, and were producing an abnormal proportion of standard products.

(*c*) They make assumptions as to machinery activity that are unlikely to be true of peace-time conditions.

In the Heavy Woollen District (Table 37) costs range from 11 per cent above to 21 per cent below the average—a wide range of variation. They are

TABLE 38

COMPARISON OF CONVERSION COSTS IN WORSTED WEAVING

Cloth A. (Cost, 95.50d. per yard of cloth)

	Size	*Percentage Variation from average Conversion Cost*	*Percentage of Looms in use*
1	Medium	117	48
2	Small	112	55
3	Medium	108	61
4	Very large	106	39
5	Small	95	45
6	Fairly large	93	43
7	Small	87	95
8	Medium	81	57

Cloth B. (Cost, 102.6d. per yard of cloth)

	Size	*Percentage Variation from average Conversion Cost*	*Percentage of Looms in use*
1	Medium	122	48
2	Small	110	55
3	Large	108	53
4	Medium	105	61
5	Very large	100	39
6	Small	94	29
7	Small	94	80
8	Small	94	69
9	Small	87	45
10	Medium	85	95

Cloth C. (Cost, 38.8d. per yard of cloth)

	Size	*Percentage Variation from Average Conversion Cost*	*Percentage of Looms in use*
1	Medium	122	48
2	Small	108	80
3	Small	105	74
4	Fairly large	100	43
5	Small	94	45
6	Very large	89	39
7	Medium	82	57

Source: Ministry of Supply (Costing Department.)

lowest in one very large firm using automatic looms and highest in the next largest firm. The small firms have costs near the average. In the small and medium firms a perceptibly higher proportion of the looms are running than in the large or fairly large. In the Colne Valley the small firms again occupy an intermediate position between groups of large firms, some with higher and some with lower costs. The firms running nearest to capacity are two medium-sized firms; none of the small firms falls below 74 per cent in loom activity.

In worsted weaving (Table 38) the range of costs is even greater, varying for the most expensive cloth from 22 per cent above to 15 per cent below the average; and for the cheapest cloth from 22 per cent above to 18 per cent below. There is again a general tendency for the extremes of cost to be in the medium and large firms and for the small firms to be close to the average. Loom activity is much lower than in the sample of woollen manufacturers but tends to be slightly higher in the small and medium firms, the average both for eleven small and eight medium firms being 60 per cent, compared with 43 per cent for six large and fairly large firms.

This evidence is hardly sufficient to warrant any conclusion in favour of the superior efficiency of firms in the larger size groups. Even in woollen weaving and finishing the average for the large firms differs only slightly from the general average and there is such a wide dispersion about the average that a larger sample might eliminate the difference or transform it into an excess.

The variations in loom activity may be more significant. The figures are chiefly of interest as an indication of the low level of activity at which many firms are working. But the margin that separates small from large firms in Tables 37 and 38 suggests that it is the larger firms that are at the lowest levels, particularly in worsted weaving, and this would seem to imply that the smaller firms are finding it easier to man their machinery.

While this may be so in present day conditions, the position may be quite different once normal peace time conditions are restored. Taking the industry as a whole it was often the decaying businesses that kept their labour best in war-time and the expanding and progressive firms that lost most labour, simply because the decaying businesses employed older workers and the expanding businesses had a higher proportion of younger workers. Further, it is much easier for a small firm to fill up with commission work than a large firm. It cannot be assumed, therefore, that conclusions derived from war-time Government contracts will necessarily apply in peace-time conditions.

STANDARDISATION AND LONG RUNS

WE have considered the possible economies that might accrue from greater standardisation and from long runs of production. The possible economies from long runs vary greatly in different sections of the industry. The position can be summarised as follows:

(a) *Wool Combing*

Provided the successive runs use wool of a quality broadly similar to the previous lot, the time taken to change over is generally no more than a quarter to half an hour. Where there is a big variation in the quality of wool processed it becomes necessary to clean up the machines and the time taken is much longer. Since it is unusual in wool combing to have a run of less than a week, the economies from long runs within the normal range of product are negligible.

(b) *Shoddy Manufacture*

The position here is similar. A small change in the type of material used takes only about an hour in cleaning up, but a large change (e.g. from woollen to cotton rags) would take a full day or more. The usual length of run is from one week to six months, so that there is normally very little saving.

(c) *Dyeing*

The economies from dyeing in quantities in excess of a full vat are small, and there are technical obstacles to increasing the size of the vats. In piece dyeing, for example, vessels are made to hold the number of pieces that experience shows can be processed most efficiently at one time. Any attempt to dye larger quantities in larger vessels results in inferior and faulty work and involves subsequent additional trouble and expense to put right what has been done wrong.

Costs rise steeply, however, when vessels are operated with much less material than they are designed to hold. Before the war, the loose material and slubbing dyers were frequently called upon to dye small weights of 25–50 lbs. to a shade (compared with a full vat of 450–500 lbs.) Much of the business of the piece dyers was in dyeing one or two pieces to a shade and the average for piece dyeing both for mens' and womens' wear was between 1½ and 2 pieces to a shade. Omitting Government sponsored bulk lines and utility lines it is probably still under 2. In slubbing and loose wool dyeing there has been an improvement and the average is thought to be 100 to 200 lbs. to a shade. This improvement is likely to be due to the prohibition by the Wool Control of the dyeing of small lots—a prohibition aimed at securing economy in the use of dyestuffs and coal and also effective in increasing output per man hour.

It is obviously desirable that small lots should be discouraged as far as possible. In this connection the services of the British Colour Council are proving helpful by enabling the dyers to group together small orders for standard shades.

(d) *Spinning*

It would be possible to make economies in spinning costs if each plant confined itself to a single count and type of yarn. It would, however, be extremely difficult or impossible for a mill to continue indefinitely on a single count of yarn of one quality and colour. The market for the yarn would very soon become saturated, and there would in any event be wider fluctuations in demand and in activity than would arise if there were a combination of counts and qualities passing through the machinery. It was put to us by several witnesses that it was rarely possible to balance the plant of a spinning mill for a limited number of counts. The normal object was to obtain a footing in export markets (which generally meant spinning high quality yarns) as an off-set to the risks involved in supplying the home market. A failure in home demand could generally be balanced against additional export orders, so that some stability was preserved in total output. The price paid for this greater elasticity is, however, a balance of plant that is not designed for the manufacture of standard products.

(e) *Weaving*

A somewhat larger economy is possible in weaving. We have been unable to obtain figures to show the economies that would result from the long-run production of cloth. It is obvious, however, that there would be some saving in pattern-making and in marketing costs and that it would be possible to weave

with full beams. The economies in direct costs resulting from orders larger than a full beam are not believed to be appreciable.

The number of cuts to a warp that is physically possible varies greatly: from, say, 3 for overcoatings to, say, 25 for linings. The number varies according to the thickness of the yarn and also with the type of loom in use: on a standard loom, for most types of cloth four or even six pieces can be mounted to a beam, and with automatic looms up to eight or nine. In worsteds made from finer counts, however the standard loom can mount fifteen or even twenty cuts to the beam.

The main operations in which economies can be made by running with full beams are warping, dressing, twisting, looming and warp-changing. A comparison is made in Table 39, based on a sample of 21 firms, between the cost of each operation with a 2-cut and a 5-cut warp. The largest economies are in looming and twisting, where the cost per warp is constant and independent of the number of cuts. The total economy is equivalent to about 1d. per yard and there is a difference of a further ½d. per yard between a 5-cut and 10-cut warp.

TABLE 39

COSTS INVOLVED IN PRODUCING A CLOTH WITH 2,500 ENDS ON A 2-CUT AND 5-CUT WARP

	Cost per cut per 1,000 ends	
	2-cut Warp	*5-cut Warp*
Average cost of warping (Firms b, c, d, i)	14.28	10.85
Average cost of dressing (Firms j, k)	19.50	13.18
TOTAL	33.78	24.03
Average of warping and dressing (Firms e, f, g, h)	27.19	15.94
Average of two previous lines, i.e., average cost of warping, and dressing (based on examples b, c, d, e, f, g, h, i, j, k)	30.48	19.98
Cost of twisting (at say 24.82d. per warp)	12.41	4.96
Cost of looming (at say 54.0d. per warp)	27.00	10.80
Average cost of twisting or looming (assuming 50 per cent looming and 50 per cent twisting)	19.71	7.88
Average cost of warping, dressing and twisting or looming per 1,000 ends	50.19	27.88
or for 2,500 ends	125.48	69.70
Estimated overheads for changing warp (say 15d.)	7.5	3.0
TOTAL costs per piece of 2,500 ends	132.98	72.70

Source: Woollen and Worsted Trades' Federation

These economies are not large in relation to the cost of finished cloth. But in relation to other conversion costs they are far from trifling. As Table 39 shows, the reduction in the specific items of cost affected is nearly 50 per cent for a 5-cut compared with a 2-cut warp. The reduction would be still larger if the comparison were with a 1-cut warp.

Moreover there are a number of indirect reactions on cost that may result from short runs. The problem of supervision and management is necessarily made more complicated and the planning of the work of the mill is more liable

to be thrown out of gear so that, for example, time is wasted between the completion of a warp and starting with another.

In a plant specially designed to make full use of automatic machinery the economies of long runs would be likely to be still larger. The automatic loom alone certainly allows some savings to be made, particularly in the woollen trade. We have had evidence from the Ministry of Supply that in seven firms weaving Service cloth, the difference in weaving costs, including overhead costs (but excluding warping, beaming etc.) was nearly 40 per cent. The reduction due to the use of automatic looms varied, as will be seen from Table 40, between 2d. and 6d. per yard. It can be taken for granted that the main factor in this reduction in cost was the higher number of automatic as compared with non-automatic looms that were minded per weaver; in other words, the economy in labour that the use of automatic looms allows.

TABLE 40

COMPARISON OF CONVERSION COST PER YARD FOR WEAVING

38 *Pick* 22½ *oz. Cloth on Standard and Automatic Looms*[1]

Firm	Standard pence	Automatic pence
A	12.5	8.8
B	12.5	6.1
C	9.4	7.5
D	10.8	5.4
E	9.7	6.3
F	12.0	7.4
G	9.5	5.4
AVERAGE	10.9	6.7

[1] Figures relate to single shift working and include overheads.

Source : Ministry of Supply (Costing Department)

This evidence is not conclusive as to the precise economies that result from the replacement of standard by automatic looms. We recommend that this should be the subject of fuller investigation and that information should also be obtained as to the type of product woven on the looms already in use, and the measure of success achieved.

The limitations of the automatic loom are discussed in the next chapter. It will be generally agreed, however, that it is well adapted to products that need not be of the highest quality and that can be ordered in bulk; and that, where standardisation is possible, it allows large economies to be made in conversion costs at the weaving stage.

The upshot of our enquiries is therefore that the direct savings in production costs from long runs are rarely large, though there are important exceptions especially in weaving and its preparatory processes. This conclusion may appear incompatible with the large difference in output per head between Britain and America. It is likely, however, that this difference arises more from differences in technique and in the quality of the product than from any contrast in the variety of product made or in the average length of run.

It should be observed that we have no data that would allow us to compare costs in a factory laid out to make the fullest use of automatic machinery within the scope of present market conditions and in a factory laid out along normal

lines and aiming at a high quality of product. We think it desirable that fuller information should be collected in order to establish the possible economies that might result from greater standardisation.

METHODS OF INCREASING OUTPUT

THE present situation is one in which there is a shortage of labour, an abundance of raw material, and a famine in cloth. We suggest, therefore, that fuller consideration should be given to ways in which a larger quantity of material might be passed through the machines per man-hour consistently with maintaining a high quality of work; and through the use of appropriate techniques, greater attention should be given to long run production of cloth for the home market and for selected export markets to which such a policy could usefully be applied.

The working of the utility scheme has already initiated a trend in this direction. In order to bring their cloth within the price ceilings of the scheme, manufacturers have had to adapt their raw material, often in ways that have meant spinning to lower counts, using fewer picks per yard of cloth, and manufacturing longer runs to a smaller number of designs. This increases output and gives cheaper cloths. There has been some falling off in the quality of utility goods brought about by the inelasticity of the price ceilings. This is damaging to the reputation of the industry and should not be allowed to continue. It would be false economy in labour to encourage the manufacture of goods of poor quality.

The techniques which we are recommending are certainly not those by which Britain can hope to capture export markets, and it is desirable that exporters should be able to offer a wide variety of designs and qualities of cloth. But if the home consumer is to make the most of the limited manpower catering for his requirements, he may well be prepared to face some limitation in the very numerous range of patterns without suffering deterioration in quality.

We suggest that the issues involved in adapting the utility scheme to secure those ends should be given thorough consideration.

CONCLUSIONS AND RECOMMENDATIONS

INFORMATION on output per man-hour and per machine-hour in the different sections of the industry should be collected. (*Page* 66.)

After making all necessary qualifications—and they are many and important—the high physical output per man-hour in the United States remains striking. (*Pages* 66 *to* 68.)

Comparisons with other foreign wool textile industries should be pursued though with due regard to the highly specialised products of the British industry. (*Page* 68.)

The Party have formed a favourable view of the general level of efficiency of the industry; quantitative tests suggest that the rate of progress has been near the average for British industry. (*Pages* 68 *and* 69.)

There are, however, wide variations in efficiency between different firms in the industry. The standard of the best is well worthy of emulation and if generally achieved would of itself produce a marked improvement of output. In this connection comparisons of cost would be invaluable. (See also recommendations in Chapter XI). (*Page* 69.)

The evidence available is hardly sufficient to warrant any conclusions in favour of the superior efficiency of firms in the larger size groups. (*Page* 71.)

The precise economies resulting from the replacement of standard by automatic looms should be more fully investigated and information should be obtained as to the type of product woven on the looms already in use and the measure of success achieved. (*Page* 74.)

In general the direct savings in production costs from long runs are rarely large. There are, however, important exceptions especially in weaving and its preparatory processes. (*Page* 74.)

No data are available for comparison of costs in a factory laid out to make the fullest practicable use of automatic machinery and in a factory laid out on normal lines, but fuller information should be collected to establish the possible economies that might result from greater standardisation. (*Page* 75.)

Fuller consideration should be given to ways in which a larger quantity of materials might be passed through the machines per man-hour; and through the use of appropriate techniques greater attention should be given to long run production of cloth for the home market and for selected export markets to which such a policy could usefully be applied. (*Page* 75.)

Some falling off has been brought about in the quality of utility goods by the inelasticity of price ceilings. This is damaging to the reputation of the industry and should not be allowed to continue. (*Page* 75.)

The issues involved in adapting the utility scheme to meet conditions now developing should be given thorough consideration. (*Page* 75.)

CHAPTER VIII. MACHINERY AND RE-EQUIPMENT

THE wool textile industry makes use of an enormous range of machinery: a much wider range than the cotton industry, for example. There are nine operations in a set of botany drawing alone, and a similar number in wool combing, from washing to finishing. It is extremely difficult, therefore, to make generalisations covering all the machines in use, and we have, on the whole, confined our attention to the main types of equipment involving a large capital outlay.

Most of the main machines are extremely durable. With proper maintenance, and in the absence of fundamental improvements, they can be made to produce with comparative efficiency for periods of well over 50 years. Some of the woollen carding machinery in use is over 80 years old; nearly a quarter of the worsted spindles and a higher proportion of the woollen spindles date from last century; and many of the looms have been in use for 50 years or more. This great durability has meant that normal replacements have been low, and that there has been no overwhelming pressure to instal new equipment at frequent intervals.

The low rate of replacement has tended to weaken the incentive to develop or experiment with new machinery. In most branches of the industry there have been few really fundamental improvements for at least a generation. The small detailed improvements in design have been incorporated in old machines by re-building at the mill or by the use of accessories fitted by textile machinery makers or firms of jobbing engineers. The machinery has come to have some of the characteristics of house property: an existing machine, after thorough

re-conditioning may prove as satisfactory or almost as satisfactory as a new one of the same type.

Both the development of new types of machinery and the re-equipment of the industry with such improved types as were developed were limited by the prolonged depression of trade after 1929. When firms were being driven out of business and having to scrap their plant for reasons other than mechanical inefficiency there was little incentive to experiment with new equipment. As will be seen from Table 41, all regions shared in the contraction that took place in the total amount of machinery installed, and the reduction was common to practically all branches of the industry. It appears to have been heaviest in looms, but as the figures may not be entirely comparable it is difficult to be certain that a reduction of as much as 30 per cent took place between 1918 and 1943. It seems to have been smallest in worsted spinning, and there was an actual increase in the number of doubling spindles. The mere fact that the total amount of equipment in the industry was shrinking rather than expanding tended to limit the pace at which advantage could be taken of changes in technique.

TABLE 41

EQUIPMENT OF WOOLLEN AND WORSTED FACTORIES BY REGION

	All Regions[1]		Yorkshire and Lancashire		Scotland		West of England		Midlands	
	1918	1943	1918	1943	1918	1943	1918	1943	1918	1943
Combs ..	2,952	2,616	1,748	2,455	67	52	38	42	88	57
Carding Engines ..	6,145	4,606	4,771	3,555	667	570	339	252	135	128
Spindles (000)										
Woollen ..	2,993	2,309	2,266	1,775	465	320	156	132	62	43
Worsted ..	3,466	3,311	3,173	3,059	22	72	21	17	190	164
Doubling	1,337	1,423	1,208	1,302	71	67	23	14	34	35
TOTAL..	7,796	6,942	6,647	6,136	558	459	200	163	286	242
Looms (000)	114.6	78.8	98.4	67.2	11.5	7.1	2.7	2.2	0.6	1.5

[1] Including Wales, Northern Ireland and Rest of England.

Source : Wool Control

That there were advances in technique nonetheless is apparent from the figures of output per head quoted in the previous chapter. To take one striking example, 4,606 woollen cards produced a greater weight of material in 1943 than did 6,145 in 1918. Moreover the installation of new machinery was far from being at a standstill. In a sample of woolcombing plants, 33 per cent of the cards and 77 per cent of the combs were installed after 1920—nearly all of them between 1920 and 1940. In other sections of the industry re-equipment went on steadily, but at a rate that varied from section to section.

During the war, large arrears of maintenance accumulated. For nearly seven years it was impossible to make normal replacements, and in addition the plant was not so well maintained because of the calling-up of engineers. Much machinery had to be stored or left idle through lack of operatives and inevitably deteriorated. There was also a greater disposition to take advantage of the development that was made in wool textile machinery in the immediately

pre-war years. The position at the end of the war, therefore, was that there was a rush to place orders, not only for complete machines, but also for large quantities of miscellaneous spares and accessories, including card clothing in particular, that were necessary to bring idle machinery back into use, or to bring running machinery to a higher level of efficiency.

At the end of 1943 the Wool Industry Reconstruction Committee estimated that the industry would be likely to place orders totalling £14.1 million as soon as the war ended. This total was made up as follows :

New machinery and plant	£8.3 million
Repairs and renewals of productive machinery ..	£3.0 „
Conversion of existing plant	£2.8 „
TOTAL	£14.1 „

Since all these figures were in terms of 1938 prices, and the cost of machinery has roughly speaking doubled, the estimates of the Wool Industry Reconstruction Committee were equivalent at current prices to an outlay of about £28 million on machinery and plant.

We have made enquiries of the machinery manufacturers as to the orders which they now hold, and the results are set out in Table 42. These figures do not purport to cover the entire machinery-making industry, but include orders held by nearly all the principal firms making new machinery. We have every reason to believe, particularly in view of the estimates which have just been quoted, that the orders now on the books do not represent the full load that will fall on the industry once manufacturers know on what terms new machinery can be purchased and that their orders will be accepted and delivery made within a reasonable period.

TABLE 42

DELIVERY POSITION ON WOOLLEN AND WORSTED MACHINERY

Type of Machinery	Value of Orders on the books		Present Rate of Delivery[1]	Ultimate Rate of Delivery[1]	No. of years required to complete present orders
	Home £000	Export £000	per month £000	per month £000	
Woollen carding ..	798	877	15	(60)	3½–4
Worsted carding ..	210	120	2	17	4
Worsted combing ..	212	261	23	..	1½
Woollen spinning ..	262	370	10	28	2–4
Worsted spinning ..	1,612	1,850	60	..	3–3½
Weaving :					
Non-automatic ..	623	1,224	45	90	3–5
Automatic ..	993				
Scouring and carbonising ..	181	47	6	10	2½
Piece dyeing ..	31	23	1	2.5	2–2½
Piece scouring and milling	77	40	2	9	1–2½
Cloth finishing ..	605	589	47	55	1½–2½
Woollen and Worsted winding and warping	124	105	12	20	½–1½
TOTAL	5,728	5,506	223	..	..

[1] Approximate figures. " Present rate " refers to mid-1946.

Source : Firms listed in Appendix VII, Table 65

The orders on the books of the machinery makers are equal to just over £5½ million for the home market and £5½ million for export markets. At current rates of delivery it will be four years before these orders are completed. It is anticipated, however, that within the next two years the current rate of delivery will approximately double, and if this expectation is realised it should be possible to work off present orders within three years or less.

Of total deliveries against orders, about 25 per cent now consists of spare parts—much the same proportion as before the war. The proportion varies between different sections of the industry and is relatively high in weaving. It is not unlikely that the dates now being quoted for the delivery of new machinery have inflated the orders placed for spares; and these orders, which also reflect arrears of maintenance, must be an impediment to an increase in the flow of new and up-to-date machinery.

There is little prospect of a rapid improvement in delivery dates, since the machinery makers have their own problems to face in increasing output. The major bottlenecks are in castings and skilled labour. As regards castings, one of the larger manufacturers is in process of mechanising four foundries and some improvement in the supply of the smaller repetition castings should be possible when this is complete. The machinery manufacturers are also seeking to substitute fabricated for cast iron components, and one firm claimed in evidence that output had been as much as 30 per cent higher than would have been possible in the absence of such substitution. Skilled labour is an even more important limiting factor, and it was put to us that the greatest assistance that the Government could provide would be by delaying the call-up of skilled young mechanics. Our attention was also drawn to the reluctance of boys to enter apprenticeship.

These are problems in no way peculiar to the manufacture of textile machinery, and so far as action can be taken to deal with them, it will no doubt be along lines similar to those necessary in order to increase the supply of cotton textile machinery. This is a subject which is already being examined by the Evershed Committee. Some firms make cotton machinery only, others wool machinery only, but many of the larger firms are engaged on both. It is inevitable therefore that some of the problems associated with the one type of machinery should come under review by a committee dealing with the other. So far as questions of priority are involved we have suggested that the Evershed Committee should take steps to see to it that the needs of the cotton industry do not lead to an encroachment on the limited capacity available for the production of wool textile machinery. Nor should the needs of any other section of the textile industry encroach upon it.

A further question of priority arises over deliveries to home and export markets. We understand that through machinery licensing the Ministry of Supply is still in a position to control the allocation of machinery between home and foreign buyers, but that it is usually left to the machinery makers to prepare their own delivery programme. A slightly different inflection may then be given to the distribution between home and export deliveries to meet the wishes of the Government. The evidence submitted to us by the machinery manufacturers suggests that most firms already give a large measure of priority to home orders in the sense that although total orders are roughly equal, deliveries to the home market are a good deal higher. Orders for weaving

machinery, for example, are in the ratio of 4 : 3 in favour of the home market, and deliveries in the ratio of about 2 : 1.

Imports of new machinery into Britain are restricted by import licensing, and as delivery takes two to three years while the licenses are in the first place valid for six months only, there is the greatest difficulty in placing orders even for development purposes. Those of us who visited Switzerland in August saw high precision machinery ready for shipment to European and South American markets where it will be used to produce cloth that must eventually compete with British exports. By contrast it was repeatedly emphasised to us that very little Swiss machinery would reach British customers because of the difficulty of obtaining import licenses. It appears to us clearly undesirable to refuse licenses for prototype machinery and we recommend that, if this is not yet the case, a reasonable number of licenses should be granted for testing purposes. We suggest also that in view of the large amount of textile machinery which is now being exported, it might be appropriate to allow some addition to present imports. This might be better than diverting a larger proportion of the output of British machinery makers to the requirements of the domestic market. In addition, owing to the present long delivery dates renewals of import licenses should be readily granted.

In forming our conclusions on the equipment and re-equipment of the industry, we have had three fundamental issues in mind :

1. Whether the equipment is as up-to-date as is desirable, and whether manufacturers are seeking to make the fullest use of the latest types, especially those likely to lead to economy in labour.
2. Whether the machine making industry is capable of producing sufficient machinery at a reasonable cost and at an early date.
3. Whether research into wool textile machinery and the development of new machines is on an adequate scale.

THE EXISTING EQUIPMENT

THE position varies greatly between one type of equipment and another, and is summarised below for each of the main types,

(a) *Wool Scouring and Carbonising*

Fifty years ago carbonising machinery was relatively primitive with oven treatment and outside drying. To-day there is a complicated range of machinery using automatic and continuous processes. A carbonising unit, at current prices, costs from £15,000–£25,000. Orders outstanding total £180,000, and may take up to 2½ years to complete. The existing plant is up-to-date and, in spite of the extra burden that is likely to fall on it if a larger proportion of burry wool is consumed by the industry, we have no reason to suppose that it will be inadequate to meet all demands.

(b) *Worsted Carding and Combing*

There have been few significant improvements in worsted carding and combing machinery for many years. Machines installed before 1914, if well maintained and modernised, can and do give as good a performance as new ones.

We have been supplied by a number of wool-combing establishments with figures showing the age of their plant. These show that very few of the combs, but a much higher proportion of the cards, date back to 1900 or earlier. A correspondingly high proportion of the combs are of recent construction.

Date of Installation	Cards Percentage of Total	Combs Percentage of Total
Before 1900	29.8	6.1
1900–1920	37.6	17.3
1920 onwards	32.6	76.6
	100.0	100.0

Orders on hand for carding and combing machinery amount to about £800,000, divided equally between home and foreign markets. These orders will take from 1½–4 years to complete, the longest delivery dates being for carding and the shortest for combing machinery. Since there is still plenty of idle machinery available, and no prospect of a large economy in labour from replacement of old machinery of this class by new, we do not attach the same importance to these long delivery dates as to delays over spares and minor replacements which do interfere with current production. These delays are particularly serious over the reclothing of cards and deliveries of electrical motors and equipment.

(c) *Woollen Carding*

In woollen carding there are greater improvements in prospect. The condensers have been redesigned; the components have been standardised; a larger proportion of fabricated steel is used in place of cast iron; and there is said to be a 15–20 per cent increase in speed, and a 10 per cent saving in power. Among the machines developed before the war, mention should be made of the Continental and semi-Continental sett which give a greater output per operative.

We have had no information on the average age of woollen carding engines in the industry, but examples have been quoted to us of jobbing orders for machinery built in 1865, 1868, and 1872; and in view of the comparatively rapid progress in the design of this machinery, it is difficult to regard these as other than obsolete.[1] From this and other indications we are disposed to think that there is more room for improvement in the equipment on the woollen than on the worsted side of the industry.

The large orders outstanding for woollen carding machinery suggests that this view is shared by the manufacturers themselves. The orders are, in fact, half as large as for looms of all kinds, in spite of the very long delivery dates—3½ to 4 years—that are quoted.

(d) *Worsted Spinning*

In worsted spinning, 60 per cent of the spindles are cap, 19 per cent flyer, 7 per cent ring, and 14 per cent mule. The number of flyer spindles has fallen by 50 per cent since 1918 and a large proportion have been replaced by self-doffers. This decline was partly due to a contraction of the mohair and alpaca trade, and partly to the cessation of the large continental, mainly German, demand for single yarns for suit linings.[2]

The most important changes in machinery design involve the use of large packages and self-doffing. Very large packages are already in use in America

[1] The "Survey of the Textile Industries," p. 167, indicates that the work done by 13,00 cards in 1870 was done by half as many in 1904. As pointed out on p. 77, there has since been a further large improvement in output per card.

[2] It was pointed out to us by the Wool Controller that if the flyer machines had diminished further, the Army would have been without its cloth, as the woollen trade could not have made the necessary quantity of the thick yarn needed for the serge Service dress, and these machines alone were suitable for the large quantities of yarn required for army socks.

but new spinning frames are required and it will be at least 2–3 years before suitable machinery is made in Britain. We have had no evidence on the economies likely to result from the use of larger packages but it is highly desirable that full information on this subject should be obtained.

The use of the self-doffer has hitherto been largely confined to flyer spindles. In view of the shortage of juveniles, by whom doffing is generally done, it is important that self-doffing machinery should be used as extensively as possible. In particular the development and use of cap self-doffers should be given high priority.

Apart from the self-doffer, there have been few recent changes in worsted spinning. It is not surprising, therefore, that 24 per cent of the machinery dates back to 1900 or earlier.

(e) *Woollen Spinning*

In woollen spinning, mule spindles form 97 per cent of the total. There has been a slight increase in continuous spinning, but frames are still insignificant in relation to mules. The proportion of spindles installed before 1900 is not known but is almost certainly higher than in worsted spinning.

Changes in the standard models immediately before the war were designed to give higher speeds, increased holding capacity of packages, and easier manipulation. The spinning speed of mule spindles in woollen spinning has been increased by 50–60 per cent by the use of spindles in separate units, without vibration and with an increase in productivity of about 35 per cent.

Present orders for spinning machinery are largely for the worsted trade, and it will be some years before they can be completed. The contrast between woollen and worsted orders is striking in view of the general impression that the woollen mills are less up-to-date.

(f) *Winding and Warping*

Automatic warp winding machinery was developed before the war in America, where the only two types in production are made. One of these, worked on the vacuum principle will shortly be in production in this country. Automatic weft winding machinery is already being made by a number of British manufacturers and arrangements are in hand to make a machine of German design. Before the war some automatic weft winders were imported from Switzerland, where they were made by three firms. High speed warping machinery, giving an increase of up to 200 per cent over pre-war, is now produced in Britain and is giving satisfactory results. There have also been some important developments abroad, and an account of some of the new machines inspected by the delegation which visited Switzerland is given in Appendix II. Britain has not in the past been conspicuously successful in developing winding and warping machinery, and has been more dependent on imports than in any other branch of wool textile machinery. An expansion in the production and use of the newer automatic machines is highly desirable.

(g) *Weaving*

Towards the end of the last century there was a displacement of narrow by broad looms which allowed an increased weight of cloth to be woven on a given number of looms.[1] Although no comparable figures are available, this trend has presumably continued since.

A second change has been the increase in the speed of the looms. In 1878

[1] " Survey of Textile Industries," p. 274.

in the woollen section of the industry the standard loom ran at 50 picks per minute. By 1904 the 100 pick loom was coming into use, and in 1926 was the normal type in the Yorkshire tweed trade. The Balfour Committee in 1927 in commenting on this change, noted that there had also been an increase in speed in the fine worsted section, but stated that in ordinary worsted weaving the maximum speed of operation had been reached 20 or 30 years previously.

The maximum speed of textile machinery obtainable without damage to quality is a matter of debate; the limits vary with the physical properties of the fibre. Nor is it only in weaving that there is difficulty in finding the optimum speed consistent with quality. In woolcombing for example, too high a speed would cause damage to the fibre and inefficient processing and would have a bad effect on the quality of the work done. In spinning the highest qualities of yarn are generally spun on mules, which have a lower output per spindle-hour. In weaving, if the machinery is run too fast, breakages occur and the cost of mending goes up; if yarn of greater tensile strength is used, the quality of the cloth is affected. While there has been a gradual and progressive adjustment of the yarn to enable it to run at high speeds, it remains true that if too much twist is put on the yarn to make it strong enough to stand very high speeds, the cloth becomes unsaleable.

It is doubtful whether the standard loom of to-day shows more than a trifling improvement in speed in comparison with looms built 40 years ago. But the modern loom, running at 110 picks per minute, gives as high a quality of cloth, and can be operated much more readily on the 2 looms to a weaver system than the older looms. It would be impossible, for example, to modernise completely looms built 25 years ago by the fitment of such refinements as pick-finders. It was put to us that 25 years could be taken to be the ideal life of a loom. Many looms older than this, however, are capable of good service, particularly when operated by weavers who know exactly how to run them.

The most important change in the design of the loom between the wars was the introduction of the automatic loom. This is in general use in the United States, where it is made by the only two firms of loom manufacturers in that country. Of the 40,000 looms installed, 28,800 are automatic. In Great Britain only a limited number of automatic looms have so far been installed. In firms belonging to the Woollen and Worsted Trades Federation the proportion of automatic looms is 6 per cent.

We have had a good deal of evidence to indicate the limitations of the automatic loom. [1]The major limitation is that at present it cannot be used on pick-and-pick work which is a very important design factor in many British wool cloths of high sales value. There are, however, at least 2 looms under development to weave single picks, and it would be a mistake to assume that this limitation will continue indefinitely. The automatic loom also requires a higher quality of warp and cannot easily be used with fine single wefts. Some of the mechanisms on the automatic loom, such as stop motions, can be applied equally to an ordinary loom. From the point of view of cost, automatic looms are about 2½ times as expensive as standard looms, and this addition to overheads is only justifiable if there is a large economy in weaving labour. In addition, with some types of automatic loom there are many incidental expenses. There is, for example, an additional outlay on the tuning of the looms; and, as the

[1] Strictly speaking, both the "automatic" and the "standard" loom are automatic machines. The difference between the two lies in the use of an automatic bobbin-changing mechanism in the former while bobbins are changed by hand in the latter.

machines are larger than the standard type, a major change in layout is generally involved. The British Northrop Company recommend the construction of a completely new weaving shed when their automatic looms are installed.

In spite of these limitations, there is obviously great scope for an increase in the use of automatic looms. It may well be true that there are some types of cloth that can never be woven satisfactorily on automatics, but it is certain that the proportion is nowhere near 94 per cent. No other type of machine can make so effective a contribution to the general labour shortage. It is true that the saving in shuttle-time is no more than 4 per cent; but with automatic looms one weaver can tend far more than when standard looms are used. The common practice has come to be four looms per weaver, although the number varies with the type of loom and is sometimes as low as two and sometimes as high as eight. There does not, however, appear to have been a full investigation of what would be reasonable, and the practice is one which is still in process of crystallisation. We have suggested elsewhere that this is a matter that should be more fully examined.

The automatic loom can obviously contribute to the problem of labour shortage. The fact that, because of lack of yarn, the shortage is not at present so acute in weaving as in other sections of the industry does not diminish the advantage of any possible contribution from the use of automatic looms. A saving in labour in one section of the industry can assist in relieving the pressure in the others.

We have had evidence that large economies are possible in weaving costs through the use of automatic looms, and the profit-record of firms specialising in the use of these looms points in the same direction. It would appear that there is now a wider appreciation of the advantages of automatic looms since they account for 60 per cent of the total orders outstanding for new looms. The completion of these orders will not, however, transform the present situation. Taking as a rough average of present prices, £200 for the standard loom and £500 for the automatic, there are on order about 3,000 standard looms and 2,000 automatic. In the entire industry there are about 75,000 looms in all. Thus, when in the course of the next few years the 5,000 looms now on order are delivered, the proportion of automatics will rise from 6 per cent to 8 or 9 per cent. In fact, if the ideal life of a loom is no more than 25 years, the current rate of delivery—and even the prospective rate of delivery—is insufficient to provide for normal replacements, far less increase the proportion of automatic looms to a figure more in keeping with their advantages.

The automatic loom is itself always in course of development. In Switzerland, for example, there is a complete absence of overhead gear, the healds being operated from the side and under the loom. This creates a feeling of space and comfort in the weaving shed. Many other developments in the construction of automatic looms are in progress both in this country and elsewhere. In Britain there are several new types of loom under development including the pneumatic rapier and Baddeley types. Reference is made in Appendix II to the Sulzer weaving machine which is now undergoing final testing in Switzerland. It will be necessary for the industry to keep a close watch on all such developments in order to take the maximum advantage of improvements in technique.

(h) *Dyeing*

Many improvements have been made in dyeing and finishing machinery during the last 20 years. Considerable use has been made of stainless steel in

dye vats of all descriptions. For wool dyeing, and hank and yarn dyeing various machines have been invented to increase production and save labour and fuel.

In Sweden the totally enclosed stainless steel dyeing machine seems to be a permanent feature of the dyehouse and there are also machines in stainless steel for dyeing warps, yarns on cheese, slubbing and raw wool, all in the same machine. This is a machine which seems to have no counterpart in this country. Although many of the older types of dyeing machines are still in use in Britain there has been more advancement in this section of the industry than in many others.

(i) *Finishing*

In wet finishing, many experiments have been tried with scouring and milling machines but in the main the industry is still using types of machine that have shown very limited improvement for a considerable time. Machines are now in production, however, that are well in advance of any that are in use in the industry. Combined scouring, milling and washing off machines, continuous washing off machines, and similar types are a commercial proposition and many of these are on order awaiting delivery. A great advance has been made in tentering or cloth drying machines and several good makes are available. Experiments have also been made with infra-red ray drying.

In the dry finishing section, multiple cutting machines, hydraulic electric presses and new types of rotary presses are available, all of which give a considerable saving on the old types.

Generally speaking, the finishing machinery in use in the industry to-day is reasonably up to date. In view of the technical advances that have been made, however, much new equipment will be required, and as will be seen from Table 42, there are large outstanding orders awaiting delivery.

(j) *General Considerations*

In drawing conclusions from this survey of machinery installed in the industry, there are three general propositions which we think it right to emphasize.

In the first place, the machinery required is relative to the object in hand. If it were our aim to transform the industry into one making goods of medium quality by mass-production methods, it would be desirable to make a drastic change in the whole layout in favour of automatic machinery and working two or even three shifts per day. If, however, quality is the first objective, and few firms are free to specialise exclusively in a narrow range of products because of the market risks involved, then the type of equipment required would be much closer to that now in use. It is our view that nothing should be done to destroy or damage the reputation of the industry for high quality cloth. But we believe that there is room for a large extension in the use of automatic machinery, particularly in winding, warping and weaving.

Secondly there should also, in any efficient industry, be a high proportion of relatively new machines in regular use. This is not inconsistent with the retention of older machinery that is durable and easily maintained particularly if sudden and unexpected changes in fashion are frequent. These changes may easily be such as to bring back into use machines that have been idle for many years and were originally designed for products that have gone out of fashion. Making allowance for this, our impression is that the industry has been conservative—not unnaturally during the period of depression—in installing new machinery ; and that, especially on the woollen side and in weaving, the industry

has not taken full advantage of the developments in technique. One result of this is that, now that it is desired to place large orders, the machinery makers are not in a position to make deliveries on the necessary scale.

Thirdly, overhanging the whole issue of re-equipment is the problem of further development in machinery; for example, the automatic loom capable of single pick working already referred to. If development is to be more rapid than in the past, there is something to be gained by delay in re-equipment until the more important modifications have been introduced into the newer types of machinery. There is great scope for research and development to improve the performance of the machinery, and extend the range of textile machinery, and it would be doubly advantageous if an intense effort could be put in within the next five years, so as to enable the wool textile industry to profit before its programme of post-war re-equipment has reached completion.

We recognise that deliveries of new equipment will necessarily be slow in view of the present limited rate of production of machinery, and the competition of overseas buyers. Accordingly, we suggest that priority should be given to deliveries of equipment that would yield an immediate economy in labour. This would cover, for example, Continental and semi-Continental type woollen carding plant, continuous woollen spinning machinery, automatic warp and weft winding machinery, high speed warping machinery, self-doffers, Peralta rollers, automatic looms, combined scouring and milling machines, modern tentering machines, and enclosed dye vats.

2. THE SUPPLY OF EQUIPMENT

WE have not addressed ourselves in detail to problems connected with the supply of machinery nor attempted to reach more than the most tentative conclusions. Pending the report of the Evershed Committee, which may be expected to throw light directly or indirectly on such problems, the following general comments may be offered.

The main machines used by the industry are made by a comparatively limited number of firms. Many of these firms are members of the combine, Textile Machinery Makers Ltd. These firms control most of the output of carding, combing and spinning machinery. In winding and warping there are about half a dozen independent firms, and in dyeing and finishing a large number of independent firms. Three firms make looms, and all three are independent of one another.

In firms which lie outside the combine there are no price agreements, and competition appears to be keen and effective in normal times. The price of equipment has increased by 100 per cent or even 125 per cent since before the war, and as costs are not subject to the same close scrutiny as is applied to the textile trades, the wool industry is in danger of being caught between controlled prices for its products and uncontrolled prices for its plant. Subject to what may appear on review by the Evershed Committee, it seems to us that the question of future prices is one on which the industry should be vigilant.

We have made enquiries as to the adequacy of the range of machinery manufactured in Britain before the war. The amount of equipment imported from abroad was relatively small. There were a few electric mules and Continental type sets of woollen cards; some Continental combing, drawing, spinning and twisting machines; a number of American and Swiss winding machines, and practically no looms. With the exception of winding machinery and some

high precision machines used in small numbers, the machinery makers seem to have been able to supply the entire requirements of the industry.

There was also, before the war, close contact between the manufacturers and users. The manufacturers took responsibility for erecting new machinery in the users' works. It was common, also, for members of their staff to spend part of their apprenticeship in a textile mill. We recommend that collaboration between manufacturers and users should be encouraged so as to ensure that the development and installation of new and improved types of machinery should take place as rapidly as possible.

It is obvious that the major problem in connection with textile machinery especially over the next few years is, purely and simply, one of increasing production. It was generally agreed that this increase would be facilitated by an increased use of standard parts and a reduced number of types. We regard this as a matter of great importance, particularly where newer types of machinery are likely to be required and installed in large numbers. The most obvious example is that of the automatic loom. Anything that could be done to increase the use of standard parts in the manufacture of automatic looms would be of great advantage to the industry.

Within the limited rates of delivery that are possible, the main problems concern priority. We have already suggested that it might be practicable to give priority to equipment likely to yield an immediate economy in labour. We do not think it necessary to suggest any disturbance of the present arrangements, whereby the home market is already given a measure of priority over export markets.

RESEARCH

IN pre-war years the British industry does not appear to have spent on machinery research sums comparable with the rate of expenditure in the United States. From the evidence given to us it would seem that Britain has a paramount position in the heavier types of machinery which have undergone comparatively little change in design, but that both Switzerland and America are ahead in the design of the newer high precision textile automatic machinery. We appreciate that outlay on development was affected in the 1930's by the slump and by the corresponding contraction in the market for textile machinery. The gap of seven years during which development was practically brought to a standstill by the war gave other countries an even more powerful advantage. We think it important, however, that the industry should remain in the forefront, since it is unlikely to be possible for Britain to afford a heavy outlay in foreign exchange on machinery made abroad, and this machinery will be bought by some at least of her competitors. We shall be discussing machinery research in Chapter X.

BUILDINGS

THE factory buildings in the industry were, for the most part erected in the 19th century; comparatively few have been built in the last 40 years. In many mills there are a number of buildings which were put up one after another as successive extensions, so that there is no single unit to which age can be assigned. The Storage Control has been able, however, to furnish us with an analysis covering the whole of the industry and distinguishing between floor space built before 1900 and after 1900. From this it appears that 77 per cent of the total

factory space was built before 1900. Of the buildings erected since 1900, a rather larger proportion are single-story buildings, but the proportion has not altered so violently as to suggest a marked trend away from the multi-story buildings that are typical of most sections of the industry.

The industry is well aware that on the whole the present buildings do not compare favourably with most of the light engineering establishments erected during the war. In many mills the roofs are low, the floors are not underdrawn, and the arrangement of the pillars prevents a satisfactory re-spacing of machinery. Most of the mills are not only old but very substantial, and could not easily be reconstructed. The successive addition of separate buildings has prevented a really satisfactory layout; and with the growth in the size of modern machinery it has been progressively more difficult to accommodate the latest types of equipment.

On the other hand, there are many mills which are well laid out, well lit and ventilated, and pleasant to work in. In others, the manufacturers have gone to great trouble to improve the appearance and amenities of the buildings; and further changes are likely once licences for adaptations can be obtained.

We have had an opportunity of visiting a Bradford worsted spinning factory, housed in premises that were originally below the average for the industry, and since modernised by the Employers' Council. This experiment is an interesting illustration of what can be done with an old building at reasonable cost to improve the lighting, add colour and brightness, instal a canteen, provide new flooring, and re-space the machinery. The improvements in this mill were made in such a way as to avoid a hold-up in production. Similar improvements in a better mill would show to more advantage, but the experiment was intended to demonstrate, and does demonstrate most successfully, that even the older mills can do much to improve their amenities and working conditions.

We have been given figures to indicate the approximate cost of improvements in a storied mill of about 20–25,000 square feet. The cost per square yard of floor is estimated at 9s. 4d. for painting and decorating the walls, ceilings, etc.; 18s. 6d. for fluorescent lighting; and for re-flooring, without removal of machinery, from 12s. for a concrete floor (which is possible in some buildings but not all) to 20s. for a hardwood floor. This gives a total of about £6,500 for the mill, including painting the machines and re-covering the floor with hardwood.

We think that it is important that manufacturers should be encouraged to improve their present buildings, and that there should be some preference in the grant of licences and materials for this purpose as soon as possible. We appreciate that any extensive replacement of present buildings could not begin for some time, but suggest that licences for the erection of new mills where necessary should be granted as soon as the need for housing has been met.

THE FINANCE OF RE-EQUIPMENT

WE have no reason to believe that the industry lacks the necessary capital or the means to acquire the necessary capital to finance re-equipment on the requisite scale.

Our attention has been drawn, however, to the difficulties of private limited companies and private firms which are subject to high rates of surtax.

These private companies and firms are a more important element in the wool textile industry than in most other British industries. The evidence given to

us suggests that they are under great pressure to sell out or to turn themselves into public companies.

The difficulty facing a company of this type is not merely its liability to surtax (which of itself reduces the total resources ploughed back into the business), but the uncertainty that it may have the whole of its profits for a period of six years assessed to surtax if it is deemed by the Special Commissioners of Income Tax to have distributed in dividends a less than reasonable part of its profits. Since companies in this position have no means of discovering on what principle the reasonableness of their decision is judged, they have a strong incentive to distribute a larger proportion of their profits than they would with fuller knowledge.

We assume that this is a matter which has been considered on earlier occasions, but if on reconsideration it were found practicable, within the limits of taxation policy, it would certainly be helpful to industry, and particularly to this industry, if rules could be laid down and published as to the minimum distribution; or if companies could be authorised to submit proposals as to the dividends to be declared to the Special Commissioners for agreement or amendment before the passing of resolutions. Either device would remove the uncertainty and assist in retaining in the industry profits that might usefully be applied to re-equipment.

We have also considered the reliefs granted to the industry under the Income Tax Act, 1945, in connection with the depreciation of fixed assets. We consider that the best way to encourage the provision of up-to-date buildings and equipment by fiscal devices is to grant relief on the actual expenditure. We appreciate that the case for additional relief in respect of the wool textile industry does not differ from the case that might be advanced for other industries; but, subject to general Government policy on this question, we feel it would be beneficial if:

(*i*) In addition to normal depreciation allowances the Initial Allowance on Buildings and Plant were increased from 10 per cent and 20 per cent respectively to 30 per cent; that is, if an allowance of 30 per cent for depreciation were made both for buildings and plant in the year of acquisition. The total allowance, over the life of the asset, would, of course, remain unchanged at 100 per cent.

(*ii*) The allowance for Wear and Tear on Plant as well as on buildings were in future calculated on new expenditure on the straight line basis (i.e. writing off the initial cost of the asset by equal annual instalments), in order to bring it into line with the best modern accounting practice.

CONCLUSIONS AND RECOMMENDATIONS

DIFFICULTIES confront the manufacturers of wool textile machinery but are not peculiar to machinery for this industry; light may be thrown by the Evershed Committee upon the action to deal with them. (*Page* 79.)

The needs of the cotton industry (or any other section of the textile industry) should not lead to an encroachment on the limited capacity available for the production of wool textile machinery. (*Page* 79.)

A reasonable number of import licences for new textile machinery should be granted for testing and some addition to present imports of textile machinery as a whole allowed. Owing to the present long delivery dates, renewals of licences should be readily granted. (*Page* 80.)

Full information should be obtained on the economies likely to result from the use of larger packages. (*Page* 82.)

Self-doffing machinery should be used as extensively as possible; the development of cap self-doffers should be given high priority. (*Page* 82.)

A close watch should be kept on machinery developments both British and foreign. (*Page* 84.)

There is room for a large extension in the use of automatic machinery, particularly in winding, warping and weaving. (*Page* 85.)

The industry appears to have been very conservative—not unnaturally during the period of depression—in installing new machinery and, especially on the woollen side and in weaving, has not taken full advantage of the developments in technique. (*Pages* 85 *and* 86.)

Intense research and development to improve the performance and extend the range of machinery is urgently needed especially in the next five years so that the industry may profit before its programme of post-war equipment is completed. (*Page* 86.)

Priority should be given to deliveries of equipment that would yield an immediate economy of labour. (*Page* 86.)

The report of the Evershed Committee may be expected to throw light, directly or indirectly, on problems connected with the supply of machinery and meanwhile only tentative conclusions are submitted but collaboration between manufacturers and users should be encouraged and the major problem particularly over the next few years, that of increasing production, would be eased by an increased use of standard parts and a reduced number of types, particularly in the manufacture of automatic looms.[1] (*Pages* 86 *and* 87.)

Manufacturers should be encouraged to improve their present buildings, a guide to possibilities being provided by an experiment made by the Employers' Council. There should be some preference for the grant of building licences and materials for this purpose as soon as possible. (*Page* 88.)

Licences for the erection of new mills where necessary should be granted as soon as the need for housing has been met. (*Page* 88.)

If practicable within the limits of taxation policy it would be helpful to this industry if certain provisions governing the computation and assessment of surtax could be modified and if the initial depreciation allowances on new buildings and plant for purposes of Income Tax could be increased to 30 per cent. (*Page* 89.)

It would be desirable that the normal depreciation allowances on new buildings and plant for Income Tax purposes should be calculated on the straight line basis. (*Page* 89.)

[1] As to machinery research, see recommendations in Chapter X.

PART III

Marketing

CHAPTER IX. THE MARKETING OF CLOTH

GENERAL

IN contrast to many other industries, no arrangements exist for agreed price-fixing in the sale of wool products. It is true that in combing, dyeing and finishing and other commision processes such arrangements do exist; but in both of these the materials handled are not the property of the processors concerned, and are merely treated by them on commission. The sale prices of such materials are therefore not a matter for these processors, but for the owners of the materials. The idea of price fixation is abhorrent to the industry as a whole; and indeed the industry has, we understand, successfully resisted attempts at price fixation by some subsidiary trades from which it needs to buy. The absence of price fixing arrangements means the absence of a mechanism whereby the highest cost or most inefficient members of the industry can be kept alive. There is thus a perpetual tendency throughout the trade, from the wool merchant at the beginning to the manufacturer at the end, for competition through the operation of price to drive out the inefficient.

DISTRIBUTION IN THE UNITED KINGDOM

BROADLY speaking, the manufacturer, whether woollen or worsted, sells his cloth in the United Kingdom in one of four ways:

(*i*) direct to the garment maker, either the clothier (men's clothes) or maker-up (women's clothes);

(*ii*) to the cloth merchant or merchant-converter for sale to the retailer, or to the small clothier or small maker-up;

(*iii*) to the large general wholesaler dealing in other commodities apart from textiles for resale to the retailer for the over-the-counter trade;

(*iv*) direct to the retailer. Such sales form a relatively small proportion of the total.

More than half the trade falls into the first category, i.e., it passes direct from the manufacturer to the clothier or maker-up, or to the multiple clothier. Sometimes, the multiple clothier is his own manufacturer.

In the second case, the manufacturer sells his cloth to the cloth merchant, who buys it in the dyed and finished state, or to the merchant-converter, who buys the cloth in the grey and has it dyed and finished for ultimate resale to the clothier, maker-up, or retailer. The cloth merchant, or merchant-converter, has several functions, including the carrying of stocks, and therefore the carrying of the market risk involved, the provision of finance, and the ability to assist the manufacturer in more continuous production by bulking orders and thus providing him with longer manufacturing runs. In general terms, trade between the manufacturers and the larger clothiers and makers-up goes direct. It is the buying of the smaller clothiers and makers-up which is more generally carried out through merchants or merchant-converters, who in such cases, not only

provide the consumer with prompt delivery of small quantities from this stock, and provide the finance, but also act as a funnel through which the demands of the very large number of small clothiers and makers-up in the country eventually reach the manufacturer in bulk. In other words, one of the functions of the merchant and merchant-converter is to act as the buying department of small consumers and as the sales department of some of the manufacturers. The need for such a sales department is particularly great in the case of the smaller manufacturers. Without it, each small manufacturer would himself have wastefully to maintain an organisation of his own.

The third case where the manufacturer sells through an intermediary is that of the sale to the wholesaler who sells to the retailer for the over-the-counter trade. In this case the functions of the wholesaler, so far as stock-carrying, finance, etc., are concerned, are as described above, whilst an additional function is to buy in bulk from the manufacturer and resell in smaller pieces to the retailer who himself sells over the counter in his own shop.

EXPORTS

FIGURES prepared by the Export Group of the National Wool Textile Executive show that of the total exports of cloth in the 12 months beginning 1st November, 1940, approximately 60 per cent were made by manufacturers themselves, and 40 per cent were made through merchants and merchant-converters. Manufacturers' direct sales are made by various means including manufacturers' own offices (under their own name or otherwise) in foreign countries, or by the employment of agents. In broad terms, it may be said, that the proportion of exports made by manufacturers themselves is highest to the larger countries and those with a higher standard of living and more stable credit conditions, whilst the merchants' proportion is higher in other countries. In the case of Canada, for instance, manufacturers' direct sales were nearly 83 per cent of the total, whilst in the U.S.A. they were 65 per cent, and in South Africa and New Zealand, 67 per cent and 65 per cent respectively. In the case of Burma they were only 11 per cent, and for Gibraltar, under 3 per cent. Clearly it is economically worth while for a manufacturer to have an organisation capable of making direct sales to important countries where a substantial volume of business can be found, but it is not worth while in the case of countries where the demand is low and credit is doubtful. Sales of wool textiles to such countries are best undertaken by concerns or persons engaged in the export of goods and materials of all kinds to those countries, and handling a large volume of goods with a given staff.

It is the recognised practice in the industry that frequent visits to overseas markets are made by the principals of exporting concerns, whether they be manufacturers or exporters. Most of such principals speak the language of the countries they visit, as do any other travellers other than principals whom those concerns send out. Care is taken to see that local agents who are representatives of United Kingdom firms, whether manufacturers or exporters, are fully conversant with technical questions relating to the products for sale. In most cases the persons concerned receive at the outset technical training at the mills, and steps are taken to bring them to this country from time to time in order that they may be kept in touch with current technical developments. The value of public exhibitions, such as the Wembley Exhibition of 1924–5, the British Industries Fair, etc., is problematical. The general opinion given

to us was that, though the industry supports these exhibitions, there is little or no evidence of any practical gain in trade from them; indeed, there is some evidence to show that they may hamper export trade, owing to the pirating of designs thus exhibited.

Steps are taken to keep in closest touch with the leading fashion houses, and the industry, through the National Wool Textile Export Corporation, spends money in this direction by staging private trade exhibitions in connection with the fashion houses. Steps are also taken to spread abroad a knowledge of the products of the wool textile industry. One distributive trade association mainly concerned with very high quality goods employs the services of a recognised advertising expert. The International Wool Secretariat is concerned with the increased use of wool in the world as a whole, and not solely in the United Kingdom. Its activities therefore are not strictly relevant but its support of the United Kingdom industry is greatly appreciated.

Both the National Wool Textile Export Corporation and the Export Group of the National Wool Textile Executive, the two bodies referred to above, are broadly speaking under the same management and were formed as a result of the Government's export drive in the early days of 1940. The Export Corporation has, until the end of June last, been financed by a levy, approved by the Board of Trade, on imports of controlled wool. Its broad function for which finance is required is to promote the sales abroad of the products of the industry. The function of the Export Group is to encourage such exports, the necessary finance being provided by the Corporation. Though the necessity for an all-out drive for exports temporarily disappeared with the coming of "Lease-Lend," the National Wool Textile Export Corporation has been able usefully to employ some part of the funds raised by the levy.

In particular, it has had, since October 1944, its own office in New York, the primary purpose being to undertake continuous market research of the United States market as a whole and to keep British wool textiles before the American public.

Prior to the setting up of this office in the United States, the National Wool Textile Export Corporation had, in 1941, employed an American firm of advertising agents to make an investigation for the Corporation of the market for British wool textiles in the United States. It is clear from the evidence of the officials of the Corporation, and of the Export Group, that the two concerns are most eager to expand their work as rapidly as possible. It is intended to open similar offices in other parts of the world, including Scandinavia, South Africa, Latin America, the Far East, the Middle East and Australasia (particularly New Zealand). The purpose of these offices, will be both to publicise British wool textile throughout the world, and to provide for United Kingdom exporters a market research service supplying up-to-date statistics and information.

FUTURE MARKETING

1. *Arrangements in the United Kingdom*

WE have considered the existing arrangements described above particularly with reference to the possibility of greater centralisation of distribution. We have no recommendations to make on the organisational side of this question because:

(1) a large volume of the goods concerned already passes direct from the manufacturer to the consumer (i.e., clothier or maker-up) and

(2) a degree of centralisation already exists in the case of the remainder of the goods, since, as already stated, the merchant organisations act as a funnel between the small manufacturer and the smaller consumer, thus saving a waste of resources at both ends.

Furthermore, it is extremely doubtful whether in an industry whose products are so diversified by changes in public taste, any organisation could be created which could forecast the public demand with any greater accuracy or any greater saving of personnel than exists under the present arrangements.

There are various points to which, under the existing framework, we think attention should be drawn.

Under present arrangements for the sale of cloth, the Board of Trade, in consultation with the Central Price Regulation Committee, fix maximum net profit margins for manufacturers and merchant converters and gross margins, to cover trading expenses and profit, for merchants or wholesalers and retailers. In the case of utility goods, prices so calculated at each stage must not exceed cash "ceiling" prices fixed for each specification. We recommend that, so long as a shortage of supplies exists, margins should be controlled. We assume that the earlier processes will continue to be controlled.

The actual rates of margin fixed for merchants or wholesalers and retailers are as follows:

	Merchants', Wholesalers' and Retailers' Margin (To Cover Expenses and Profit)	
	Utility Cloth	*Non-utility Cloth*
	per cent	*per cent*
Cloth bought in lengths over 45 yds. and sold in lengths over 30 yds.	17.65	21.22
Cloth bought in lengths over 45 yds. and sold in lengths, 7–30 yds.	17.65	33.⅓
Cloth bought in lengths over 45 yds. and sold in lengths under 7 yds. ..	17.65	50
Retailers' margin	37.94 or 33.⅓	42.86

The wholesale margins apply only in the case of firms who carry stocks and have a regular organisation for supplying retailers or makers-up. For wholesalers who do not satisfy these conditions a gross margin of 5 per cent on cost is fixed.

Appendix IV contains some examples of the working out of these arrangements. In each of these illustrations the original price of cloth, as it leaves the manufacturer's mill, is assumed to be 15s. per yd., and in each case the purchase tax is rated at 33⅓ per cent. In general, purchase tax is paid on the net wholesale price, but where cloth is delivered direct from the manufacturer to the retailer, the purchase tax is levied on the manufacturer's sale price increased by a notional wholesale margin so that the amount of tax paid is the same as if the goods had passed through a wholesaler.

We do not think that the margins permitted to merchants or wholesalers, particularly in Utility cloths, bear an unfavourable comparison with those generally in force in other trades throughout the country. Our terms of reference preclude us from going into the question of retail margins but the vast difference between the manufacturer's price of cloth and the retailer's price of cloth and of garments suggests the need for a close examination. We understand, however, that distributors' margins for wool cloth are under review at the present time.

There has been some discussion of the effects on manufacturing processes of seasonal fluctuations in demand. The evidence tendered to us did not appear to show that even in normal times such fluctuations caused serious discontinuity of work, and therefore of employment. We recommend, however, that when normal market conditions once more obtain manufacturers should take steps to guard against the ill effects of such fluctuations, by a careful planning of their work to meet United Kingdom demands and their work for export markets, so that the necessary continuity may be obtained. The placing of contracts on behalf of Government departments and public bodies should also be used as far as possible to stabilise the demand.

We have discussed the question of substitutes for wool textiles especially rayon. Although rayon has ousted wool in some products such as linings, in others it is a complement rather than a rival. Moreover the wool textile mills are capable of using rayon in association with, or as a substitute for, wool itself. While this may be the present position we recommend that the industry takes steps to see that its machinery is kept continuously up-to-date from this aspect, and that it is not losing work to the competition of rayon, either in the United Kingdom or elsewhere. There should be continuous consultation between the wool textile industry and the British Rayon Federation.

We have considered the practice of the industry in relation to terms of sale and over-measure. We are in agreement that the practice of over-measure is one that should be abolished and that it is most desirable that the terms of sale should be standardised. We understand that efforts in this direction are now being made and a large measure of agreement has already been obtained.

Any wholesale policy of standardisation of output would be impracticable in the industry, owing to the widely known diversity and volatility of taste and fashion both here and abroad. So far as the United Kingdom is concerned, such a policy would run counter to the general trend. Owing to the re-distribution of the national income, and to the greater volume of purchasing power in the hands of the public which a full employment policy can be expected to produce, the general tendency must be for an up-grading and a widening of consumer's choice.

At the same time steps can undoubtedly be taken with advantage to curtail the excessive concentration on specialities of pre-war years. A reduction in the size of the range of goods has already been recommended by the Wholesale Textile Association in the final Report of their Post-war Reconstruction Committee. The Woollen and Worsted Trades Federation have submitted evidence showing that the number of pieces to a warp is now 28 per cent higher than before the war and that a much smaller number of firms are prepared to accept orders for single pieces. In the sample of 21 firms covered by their enquiry the number of pieces to a warp for a variety of cloths was as follows :—

	Greatest	*Average*	*Least*
Pre-war	8.53	5.05	3.08
1946	9.81	6.46	4.15

The services of the British Colour Council have been of assistance in reducing the variety of colours in use. Dyers have agreed to dye a smaller number of pieces to a shade where the shades conform to the British Colour Council's recommendations, since it is then possible for the dyer to group together a number of small orders without requiring to treat each separately.

This greater standardisation has been of material assistance to the industry

in allowing it to meet the shortage of labour and in offsetting the fall in productivity that might otherwise have occurred through the withdrawal of its younger, and often its more highly skilled operatives. We are glad to know that the question of standardisation is under joint examination by the Wool Textile Delegation and the British Standards Institution which specialises in such subjects.

We discuss in Chapter XII the need for closer relationships between the different branches of the textile trades and suggest machinery for joint consultation through an Advisory Council. It should be possible for this Council to play an active part in maintaining contact between manufacturers and their customers whether consumers or merchants. This contact would assist in the interpretation of public taste, the limitation of short runs and in many other ways.

The Advisory Council might also assist in maintaining contact between the producers of hosiery yarn and the hosiery industry. We have had no evidence that the quality of the yarns produced has been other than satisfactory, but the supply is, and may remain, a source of anxiety to hosiery manufacturers ; and it is desirable that the possible ways of supplementing the supply or of making the best use of it should be jointly considered.

There is scope also for consultation between the wool textile industry and other consumers such as the clothiers and makers-up, and also, as suggested in the Post-war Report of the Wholesale Textile Association, between the wool textile industry and the merchant-converters and wholesalers.

2. *Exports*

We have discussed in Chapter III above the prospective exports for which it would be reasonable to plan. We drew attention to the difficulties that were likely to be experienced because of the growth of indigenous industries in countries previously supplied by the United Kingdom, but suggested that it might be possible for Britain to achieve an increase in the volume of exports to 20–25 per cent above the pre-war level. This is not incompatible with a larger increase in the immediate post-war years.

We have also considered, in view of the importance of increasing exports, what might be done to assist in making the most of the market opportunities.

The first and most important recommendation which we have to make concerns information services on market opportunities in different parts of the world. We have already referred to the proposed activities of the National Wool Textile Export Corporation. The work done by the Corporation has been extremely valuable and should at all costs be continued. Not only should the Corporation assume responsibility for market research—a subject to which we return below—but it should be the point of departure for any further experiments in export marketing and the accepted organ for making future marketing arrangements.

The offices which the Corporation propose to set up will cover the principal areas in which British cloth was exported in 1937 with the exception of India and Canada. It may be that the Corporation's present New York office is intended to cover Canada, but we are doubtful whether this is a suitable arrangement, and we recommend the setting up of an office in Canada itself. It is understood that an office in India, which is intrinsically desirable, is to be included in the Corporation's present plans. In two other areas, China and the Dutch East Indies, the potential demand, at any rate, is ultimately great. Owing to the small purchasing power of the inhabitants of these countries, a substantial

increase in exports thereto from the United Kingdom is not immediately possible. Moreover contrary to the popular view the Chinese population appears to be as keen on fancy materials as users elsewhere. While, therefore, there may be no immediate outlet for medium or low-priced cloth in large volume, we recommend that the Corporation should take an early opportunity of investigating this problem.

Although the present marketing organisation is good, it might be improved in various ways and we suggest that the Corporation should take an early opportunity of a full review taking into account some of the experiments that were made during the war. A number of suggestions have been put before us, and they appear to merit examination by the Export Corporation.

It has been suggested to us, for example, that overseas distribution costs could be reduced if a number of manufacturers producing goods which did not compete with each other co-ordinated their sales organisations, instead of each having separate organisations. In such a way distribution costs should be reduced, whilst the selling organisation should tend to prove more efficient and attractive to the buyer, since it would have a greater volume and variety of goods to handle. Such a practice is followed by one consortium of manufacturers who employ it with success in one of the main importing countries. It is also a common practice for overseas agents to represent several manufacturers; but the suggestion made above refers to the manufacturers' own selling organisation, not to independent agencies.

The Corporation is primarily occupied with publicity and market research and it ought not to assume trading functions. If, however, a serious attempt is to be made to obtain a larger share of the American trade in medium price cloth this attempt should be a concerted one and might have to be conducted by a large exporting concern carrying stocks in the United States ready for immediate sale. The Corporation should consider whether a special marketing agency for this purpose should be created.

We have heard evidence of the difficulty of protecting trademarks in foreign countries, and also of the extent to which British designs are pirated. We appreciate that little or nothing can be done on the latter point, but we recommend that the Board of Trade give the industry all the help that it can in the matter of trade marks.

If the export trade in wool manufactures is to be developed, we think that it is important that foreign buyers who wish to make direct contact with the industry should have the advantage of more rapid train services and increased hotel accommodation in Bradford and other centres of the industry. Without easy opportunities for buyers to visit the mills they are likely to stay in London where it is impossible to exhibit the full range of patterns.

UNITED KINGDOM AND MARKET RESEARCH

THE finance available to the National Wool Textile Export Corporation was provided until the 30th June last by a levy of 1–10th of 1 per cent of the value of wool sold by the Wool Control, the levy being collected under the Board of Trade "Encouragement of Exports (Wool Textiles) Order, 1941." Since normal distribution methods of raw wool have been restored, and the Wool Control therefore no longer sells wool, the Order in question has been revoked, and the question of the future provision of the necessary funds is now under consideration jointly by the Board of Trade and the industry.

It is not easy to forecast the future expenses of the Corporation. At present in export publicity and research alone the New York Office costs over £5,000 per annum and it is the intention of the Corporation to set up at least six more such offices. There is, moreover, a real need for market research of a statistical character to supplement the surveys, publicity and information services already undertaken by the Corporation. This should not be confined to export demand but should include an analysis of general market trends such as we have suggested in Chapter III. We feel that it is desirable that the functions of the Corporation should be extended in this way. We also attach great importance to research of this general character and suggest that it should be conducted by the Corporation in association with the Standing Committee on Statistics referred to in Chapter XI.

While it is impossible to make a precise estimate of requirements it would probably be appropriate to think in terms of a sum of £50,000 per annum and this is in fact the sum suggested by the industry in their proposals for a Statutory Levy which have already been submitted to the Board of Trade. These proposals are discussed further in Chapter X where we endorse them and recommend that arrangements should be made between the Board of Trade and the industry with as little delay as possible.

Apart from the current expenses of the Corporation it is desirable that there should also be some capital in reserve. It is understood that at the end of February last there remained in the hands of the Board of Trade a sum of approximately £147,000 representing the unexpended balance of the Levy accumulated during the war years. Some part of this total, although not a large part, will be required to meet current expenses until the projected Statutory Levy is collected. Of the remainder the bulk should in our view be set aside for scientific research and the sum provided for this purpose might be approximately £100,000. The remainder would be a most valuable addition to the resources of the Corporation at a time when it is about to launch its campaign for wider representation throughout the world and we recommend that the Corporation should be allowed to share in the total balance on the basis suggested above.

CONCLUSIONS AND RECOMMENDATIONS

so long as a shortage of supplies exists, margins for manufacturers, wholesalers and retailers, as in the case of the earlier processes, should continue to be controlled. (*Page* 94.)

The margins permitted to merchants appear to compare favourably with those generally in force in other trades throughout the country. The terms of reference preclude the Party from going into the question of retail margins; but the vast difference between the manufacturer's price of cloth and the retailer's price of cloth and of garments suggests the need for a close examination. (*Page* 94.)

In the normal future manufacturers should guard against seasonal fluctuations by careful planning as between home and export demand. (*Page* 95.)

There should be continuous consultation between the wool textile industry and the British Rayon Federation. (*Page* 95.)

Following efforts now being made, over-measure should be abolished and terms of sale standardised. (*Page* 95.)

Steps can be taken with advantage to curtail the excessive concentration on specialities of pre-war years. Arrangements already in being have been of material assistance in meeting the shortages of labour. The question of standardisation is under joint examination by the Wool Textile Delegation and the British Standards Institution. (*Pages* 95 *and* 96.)

There is scope for consultation between producers of hosiery yarn and the hosiery industry and also between the wool textile industry generally and other consumers, as well as merchant converters and wholesalers. (*Page* 96.)

The National Wool Textile Export Corporation should certainly be continued and expanded. (*Page* 96.)

It should explore the potentialities of export to China and the Dutch East Indies. (*Pages* 96 *and* 97.)

The Corporation should make a full review of the marketing organisation taking into account some of the experiments made during the war. (*Page* 97.)

It should consider whether a special marketing agency should be created to obtain a larger share of the American trade in medium price cloth. (*Page* 97.)

The Board of Trade should give all the help it can in protecting trade-marks in foreign countries. (*Page* 97.)

In the interests of the export trade foreign buyers should have the advantage of more rapid train services and increased hotel accommodation in Bradford and other centres of the industry. (*Page* 97.)

Of the projected annual levy for general research purposes one-third, or roughly £50,000 per annum, should be allocated to the Export Corporation, and of the accumulated balance of the former Encouragement of Exports Levy a similar proportion (roughly £50,000) should be used to meet current expenses of the Corporation till the new levy is available and to add to its resources as it is about to launch its new campaign. (*Page* 98.)

PART IV

Research and Information

CHAPTER X. RESEARCH DEVELOPMENT AND DESIGN

THE textile industries are amongst the oldest in the world and the long story of their development to their present eminence is an example of empirical research that has led in the course of time to success of a very high order. Because of their vast accumulated experience, however, and also because of the complex molecular structure of textile fibres, which until recently have been almost all of biological origin, science has been a long time in catching up with the textile industries, and indeed it has hardly been possible until this century to make profitable use of scientific techniques and reasoning. It is only in the last quarter of a century, for example, that science has revealed the molecular structure of textile fibres. In recent years there have been rapid scientific advances, and the time has arrived when the study of fibres can take its place in the whole body of science and their uses be further developed on new principles.

Universities, Technical Colleges and other educational establishments that include the science and technology of textile fibres in their curricula date in the main from about the end of the 19th century. They, too, have taken up serious textile research only in the last twenty or thirty years but with a remarkable acceleration of pace. The Wool Industries Research Association and other similar institutions originated in the difficulties of the first world war and represent a deliberate effort on the part of the Government to co-ordinate science and industry.

EXISTING RESEARCH FACILITIES

THE main institutions now employed in research into the problems of the wool textile industry are of four main types:

(1) *Universities*

So far as we have heard, Leeds is the only University in this country which at present researches into the problems of the wool textile industry. But the Department of Textile Industries in that University has made the major contribution to an understanding of the properties of wool fibres. The Department has served the wool industry well for many years and has gained a reputation second to none in any part of the world. In spite of its high output, however, the Department has been seriously embarrassed through lack of funds and has a continual struggle to carry out all that it would like to do. Its independent assured income for research facilities has been so inadequate that it has been obliged to seek support from various firms, occasionally with the proviso that they should have first call on any results obtained from the research undertaken. This proviso does not involve ultimate secrecy, for all results are eventually published. Nor is there any question of University facilities being reserved to the advantage of one firm and the disadvantage of others; the facilities are equally available to everyone and many firms have greatly benefited from them. But it would be much better if the University had the

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greater freedom that would follow from a supply of funds to which conditions of this kind were not attached, and the much larger financial provision which, we understand, is contemplated by the Government for University purposes may well contribute to this end.

In addition to the research work undertaken, Leeds University has an equal responsibility for the teaching and training of technologists. A disappointingly small proportion, however, of those who are trained at Leeds elect to enter the wool textile industry.

(2) *The Wool Industries Research Association*

Like Research Associations attached to many other industries this is a Research Institution set up with the assistance of the Department of Scientific and Industrial Research and drawing its funds partly from the industry, partly from a Government Grant and partly from royalties and fees. The Association, which is housed at Torridon in Leeds, has undertaken research on a wide variety of subjects.

Sometimes the research is severely practical, and is undertaken either in response to an operational difficulty encountered by a member firm, or to deal with an urgent problem raised by the Government or by a shortage of materials or labour; sometimes it has a more general aim and is designed to bring about some specific improvement in the efficiency of the industry, or the quality of its products, or to develop some new use for wool. Sometimes it may concern itself with matters affecting the welfare or working conditions of the operatives. Part of the work is of a fundamental character and is intended both to keep the Association in touch with the latest advances in scientific knowledge and to fill a gap in that knowledge of special importance to wool technology. It is in fact a condition of the Government Grant administered by the Department of Scientific and Industrial Research that a substantial amount of work of this character should be undertaken.

Ten years ago the total income of the Association from all sources was about £20,000 per annum but this has since increased and in recent years has been approaching £50,000 per annum of which about £15,000 to £20,000 is raised within the industry. This latter sum, however, represents less than .02 per cent of the value of the product in pre-war years of the industry as a whole.

(3) *Technical Colleges*

Most of the large textile towns in the West Riding have Technical Colleges principally for the purpose of providing training in the technology of the wool textile industry. There are also Colleges at Galashiels, Stroud and Trowbridge. These Colleges have done excellent work as Teaching Institutions and have undertaken a limited amount of research. Many of them, however, are badly equipped and lack the finance to attract the staff required to bring them to the level of a modern University. We have had evidence that Bradford Technical College in particular has a status not in keeping with its location in the largest centre of the industry. Little or no research is undertaken. There is a shortage of suitable staff and equipment and the pressure of teaching duties, especially in present circumstances, effectively prevents the development of research work along lines complementary to those undertaken by other institutions.

(4) *Wool Textile Firms*

Some of the larger firms have their own laboratories in which research tends to be limited to the practical problems encountered in the running of the mills.

INADEQUACY OF PRESENT FUNDS

AT the outset we record our conviction that the funds that have so far been available for research have been quite inadequate. They have borne little relation to the opportunities for useful research that are steadily opening up, and their inadequacy has been a source of unnecessary friction and irritation owing directly or indirectly to the competition between the existing institutions for the limited funds available. In our view increased expenditure on research would do much to remove the present unsatisfactory relations that exist both between the Textile Department of Leeds University and the Wool Industries Research Association at Torridon, and between these institutions, the Technical Colleges and the firms themselves. The relatively favourable support accorded to the Research Association has re-acted detrimentally to the welfare of the educational establishments where took place the first struggles to introduce science into the industry.

THE RELATIONS BETWEEN EXISTING RESEARCH INSTITUTIONS:

(a) *General Principles*

THERE is great need to remedy this situation and to co-ordinate all wool research activities along lines of co-operation and trust. Before making recommendations to this end we state our view as to the respective spheres and functions of each research agency. In what follows, seeing that the attention of the industry seems so far to have been directed towards the Research Association almost to the exclusion of other agencies, we are at pains to emphasize the parts that other agencies can play.

It has been usual in the past to sub-divide research into "pure" and "applied," but such a distinction has now lost much of its force. The fields in which scientific knowledge is cultivated extend without any real break between the University laboratory and the factory workshop. It is perhaps better—and sufficient for our purpose—to talk of long-range or fundamental research and of short-range research. This is a convenient distinction but there is no place where one can safely draw the line. The interactions of fundamental and industrial research are so intimate and unexpected that the most striking advances are often brought about only when both sides have at least a good working knowledge of the achievements and aims of the other.

Combined with a convenient division of labour between the research agencies there must be efficient liaison and information services; and in these busy days liaison and information are so important that unless they are looked after with special care much research effort is wasted.

The Universities of the country are still far and away the main sources of scientific knowledge and discovery, and in peace-time the scientific output of the Universities, in its influence on the current of thought, naturally greatly transcends that of Research Associations whose activities are mainly directed to specific objects. Hence the main nourishment of the Research Associations must still come from science as it is carried out in the Universities; nor should the one type of institution be encouraged at the expense of the other. It is also clear that University research must have sufficient contacts with what is happening in industry, firstly in order that it may gain due benefit from advances in industrial science and secondly in order that the more fundamental developments may stimulate industry in the shortest time possible. Given this leaven of utilitarianism, however, the emphasis in a University must be predominantly on

fundamental research: it must do what it likes and, what is more, it must be equipped to do what it likes. Britain's great modern industries are the fruits of disinterested work in the laboratory, and the time is fast arriving when pre-eminence or otherwise in her traditional industries will be decided largely in a similar way.

While (in the sphere of research as distinct from teaching) the investigation of fundamental problems is the great duty of the Universities, the investigation of manufacturing problems not involving elaborate research is well suited to the curricula of Technical Colleges, giving them just that contact with the industry and with local affairs that can enliven their teaching.

What then are the proper functions of a co-operative research association? The first is surely to go out into its appropriate industry, to seek there the broad problems and processes involved, and to submit them to careful scrutiny in the light of the best scientific knowledge available. In other words, it must ask itself how and why the industry has arrived at such processes, what is the scientific reason for the success attained and what new techniques can be devised to implement the principles thus revealed to the utmost possible advantage. Its second main function is just as surely to see to it that fundamental advances take the quickest possible path to industrial practice; that is to say, it has the prime responsibility for making certain that new knowledge is used without delay both in the improvement of existing processes and in the creation and evolution of new processes. To ensure that these concerns of a Research Association are properly carried out, it follows that the Association must link up effectively both with fundamental research in the Universities and with industrial practice in the factories, and it can hardly do this without carrying out on the one hand a certain amount of fundamental research of its own and on the other a certain amount of investigation into *ad hoc* problems submitted by its member firms. The volume of fundamental research appropriate for a Research Association has, we understand, been the subject of considerable discussion. Convinced as we are that the Association at Torridon requires in any event a large increase in its financial resources we do not feel it necessary for us, as a Party, to express a decided opinion on this general question.

It may suggest an overlapping of effort to say that individual firms should also try to carry out original investigations; yet we press this strongly. Nothing is quite so good as actual participation in research, and nothing is more calculated to arouse interest in the progress of research as a whole, even though such participation be on the most modest scale. One of the problems of the wool textile industry is to maintain an enthusiasm for its development amongst everyone concerned, and above all to convey to the younger generation that here is something worthy of the best they can give, something of never-failing interest, if not full of the most exciting possibilities. It is not a practical proposition—nor is it necessary—for every firm to be equipped with a first-class laboratory; but every firm should always devote at least a little of its care to some investigational child of its own. Any worker with an idea on which he wishes to experiment should be able to count on the fullest possible facilities either at the factory or at the Research Association.

(b) *Practical Difficulties*

Relations between the Textile Department of Leeds University and the Wool Industries Research Association at Torridon fall distinctly short of what would be in the best interest of the industry. What should be the usual healthy

scientific competition has grown into something like rivalry. The underlying causes need to be eliminated once and for all. The Research Association is affiliated to the University for the purpose of taking research degrees, there is some representation of each on the other's committees, and theoretically there is supposed to be co-operation all round; but at present effective co-operation is absent.

The work done at Leeds University and the financial difficulties by which it is handicapped, have been referred to above. The Research Association too, publishes valuable papers on investigations of a fundamental character. But although the Council of the Association includes the Vice-Chancellor of Leeds University in its membership, the head of the Department of Textile Industries is not accorded membership either by co-option or otherwise. Many supporters of the Association at Torridon, while granting that the discoveries that have been made at the University are of high value, also say that such results are of equal value to their competitors and they do not see why results for which they subscribe for their own special use should be broadcast all over the world. For one cause or another the general atmosphere is not good, and we believe that the wool industry as a whole is a loser thereby.

It would appear that there is a similar lack of understanding, though of less significance, between the University and Bradford Technical College. There are excellent relations between the University and various other Technical Colleges in Yorkshire, but apparently these do not extend to Bradford for reasons which are not easy to define but which we believe find their root in the dissatisfaction of Bradford with its present status.

(c) *The Need for Co-ordination*

It is evident that wool research as a whole is at present largely unco-ordinated and badly needs the guiding, if not controlling, influence of an Advisory Research Council. It would be unnecessary for such a Council, which might be called the Joint Advisory Wool Textile Research Council, to concern itself with the details of investigations—that would be the business of the relevant research committees in the University, Research Association, and Technical Colleges—but it would be charged with the duty of arranging that the respective types of investigation cover more or less the grounds we have outlined, of eliminating undue overlap, and of encouraging friendly co-operation. We realise that in industrial research there is always the problem of secrecy, but there is a beneficial give-and-take in these things, and there are obviously so many lines inviting co-operative investigation to the advantage of the whole industry that secrecy or otherwise in more circumscribed fields is a secondary matter. It would be one of the principal tasks of the proposed Council to go into this question and try to arrive soon at a ruling agreeable to all concerned.

The proposed Council is not likely in present circumstances to form itself spontaneously. We suggest that the Department of Scientific and Industrial Research or some other Government-nominated authority should invite representatives of Universities, the Wool Industries Research Association, the Technical Colleges, the Employers, and the Trades Unions (preferably with some independent voices in addition) to meet together for the purpose of setting up such a Council.

THE FINANCE OF RESEARCH

OF the difficulties that now stand in the way of full and whole-hearted co-operation in research, one of the most important, if not the most important, is

to be traced to shortage of funds in the educational establishments as compared with those available for the Research Association. An opportunity is now about to occur to relieve this shortage. We understand that the Wool Textile Delegation have already decided to apply to the Board of Trade for a Statutory Levy designed to raise £150,000 per annum for general research purposes and that this proposal merely awaits final decisions of detail and ratification by the Board of Trade. This is a proposal which has our complete approval.

Of the total of £150,000 we understand that it is intended to assign £100,000 per annum for scientific research and the remainder for market research, both for the home and export markets. We suggest that the sum of £100,000 should not be spent solely on the work of the Research Association but that part should be diverted to meet the needs of Universities and Technical Colleges engaged in textile research and that up to 25 per cent should be devoted to this purpose. This amount would be administered by the Joint Advisory Wool Textile Research Council and would constitute a pool which could be drawn upon by any worthy textile research project over and above the activities of the Association at Torridon.

Though textile research and training in the establishments which would benefit are mostly inspired by the problems of the wool industry, they are not confined exclusively to wool. Our proposal, therefore, involves the use of the proceeds of a Statutory Wool Levy for purposes that include development of other fibres. Any narrower viewpoint would be out-of-date. Other industries have already made contributions that have been of benefit to the wool textile industry. They would in their turn stand to benefit from some of the research sponsored by the proposed Research Council, and we recommend that the Council might properly invite them to co-operate in this research and contribute to its cost.

In addition to the funds that will become available from the Statutory Levy there is also a large accumulated balance amounting to £147,000 left over from the Encouragement of Export Levy. We have already drawn attention to the need to provide for the expenses of the National Wool Textile Export Corporation and for assisting the Corporation both in general market research and in its efforts to provide information facilities for the industry in the chief export markets. It should, however, be possible to provide for these requirements and leave a large balance that might amount to as much as £100,000. This balance would be invaluable in providing for expenditure by the Research Association and the other research agencies. We recommend that the sum of £100,000 should be set aside from the Export Levy for the promotion of research and that it should be administered by the Joint Advisory Wool Textile Research Council to provide grants in the same ratio as we have already recommended for annual subventions to the Research Association and the other agencies.

DEVELOPMENT

DEVELOPMENT on a larger scale of new ideas and processes in the wool textile industry is at present chiefly an activity of individual firms working either on their own behalf or in co-operation with the Research Association or with the teaching research establishments. Instances have been brought to our notice of members of the staff of the Research Association or other institutions being sent out to take part in such experiments. This is all to the good, and the more it takes place, the better.

Development of new ideas under actual works conditions through intimate co-operation between research centres and the firms themselves is a valuable step forward. All new ideas requiring extensive development should be given the benefit of a thorough test under normal working conditions, and we hope that it will be possible for the Research Association to come to suitable arrangements with private firms to make use of their machinery and plant whenever necessary. Apart from any progress that is made on a scientific plane there is scope also for emulating the best practice in the industry and for a wider dissemination of knowledge as to the best practice. Much might be done, for example, by comparative costing and by comparison of the techniques and working conditions in different mills. While this type of research is not primarily the responsibility of the Research Association and might be carried further by other agencies, including the Trade Associations, there are many problems of a semi-technical, semi-economic type in which the Research Association might play a useful part.

The Research Association should continue to have access to factories which are willing to provide the necessary facilities. It should also have at its disposal greater facilities for practical experimental testing of suggestions both from the Research Association and from other Research Institutions and for general experimentation on problems of production. These facilities could take the form either of development units or other necessary plant housed in suitable premises.

The present buildings occupied by the Research Association at Torridon were something of a make-shift and do no credit to the industry. We understand that in the negotiations for an expansion of research, it was generally agreed that there should be complete freedom to start again as regards site, staff, etc., and that the industry should not be bound by the present arrangements. We agree that it would be unwise to embark on fresh capital expenditure on the present building on its present site and that it should be abandoned as soon as a new research station can be erected on a much more comprehensive scale and in a more central position.

LIAISON AND INFORMATION

TRUE appreciation of the spirit, meaning, and implications of research is still disappointingly low both amongst the general public and in the wool industry. Even in the minds of many people in responsible positions, who subscribe freely to the Research Association, there is only the vaguest idea of the method and significance of what is being done.

The two most common criticisms that have been expressed to us by witnesses are :

(1) that the Research Association neglects the problems arising in the particular branch of the wool industry in which the witness is engaged ; and

(2) that such reports and publications as they do send out are unintelligible and next to useless to the " practical man."

The truth is that many of the findings of research are failing to penetrate into the very places it is sought to help, mainly because the language and technique of communication are inadequate. In a sense, we believe that of all our conclusions this is the most serious and far-reaching. Without good liaison and information services, the value of research work is vastly diminished and

the adoption of new techniques greatly retarded. In view of the need for greater appreciation of science and of the complexity of wool technology, a really satisfactory solution will hardly be reached until the general standard of textile education has been greatly raised. At the same time, increased effort and thought must be given to the popular lectures, courses, and publications which are even now such a notable feature of many wool textile districts, but which, it seems, have so far fallen short of their aim. In the popularisation of technical knowledge a great responsibility must be borne in the trade press which is the normal agency through which new knowledge reaches the industry.

We are pleased also to note the excellent and comprehensive new Department of Scientific and Technical Liaison now being set up by the International Wool Secretariat. One of the aims of this body is to make the actual purchaser alive to the advantages of new processes, and we believe with them that intelligent discrimination on the part of the purchaser would be a powerful influence in ensuring that the fruits of research are properly gathered.

Finally—and above all—we would draw attention to a growing tendency in the larger firms in other industries, especially in America, to engage a scientist in an advisory capacity to keep the firm fully informed of what is going on and to interpret new scientific developments in the language of the factory. It is not every firm that could employ such an advisory scientist, but groups of firms who are individually too small to run laboratories of their own and who look to the findings of the Research Association and other agencies should co-operate in this way in order to reap the advantage in the shortest possible time of everything that is discovered.

We recommend, therefore, that increased efforts should be made to raise the general level of education in technique and in the properties of wool textiles and that more careful thought should be given to methods by which the latest advances in science can be brought to the attention of those who are engaged in the industry. The latest results of science ought to be interpreted in the language of the factory and the workers and the public should be made aware of the advantages to be obtained from new processes and products. In this work the research centres must co-operate by aiming at a wider public than is normally in direct touch with the work done in the laboratories. There is room also for the inclusion on the management or staff of firms in the industry of persons trained in science and capable of ensuring that all new discoveries are quickly observed, interpreted and employed in actual manufacturing processes.

SCIENTIFIC AND TECHNOLOGICAL TRAINING

THERE is a recognised need for an all-round raising of the level of wool textile education, and particularly as regards its scientific content. British textile crafsmanship, like British science, has long been in the front rank, but a much closer identification of the two is required than has been thought worth while in the past, and a much keener appreciation and understanding of each other's problems. We need both more and better wool textile scientists and technologists, and better institutions in which to train them. The chief problem here arises in the Technical Colleges, which are unworthy of Britain's industrial standing and which demand the urgent attention of the Educational Authorities. We have specially in mind Bradford Technical College, which it seems to us should be better equipped and, in any reorganisation of the kind envisaged in

the Percy Report, raised to a status more in keeping with the industrial importance of the locality it serves.

It is gratifying to note the growth of training and scholarship schemes such as those of the Textile Institute and Textile Machinery Makers Ltd., and it is encouraging to observe the increasing interest in refresher courses both at teaching institutions and the Research Association. We particularly wish to stress the value of refresher courses, and we should like to see a greater attendance at these and at public scientific and technological lectures of persons holding higher industrial positions

MACHINERY RESEARCH

IT seems to be generally agreed that no revolutionary ideas in textile machinery have emerged for very many years, and that really fundamental research in this field has been too long neglected. There have indeed been steady improvements, but the impression we have gathered from the evidence received is that these improvements consist rather of modifications brought about by suggestions passing back and forth between user and manufacturer than of truly basic innovations. Since the mechanical discoveries of the Industrial Revolution there have been enormous advances in mechanics and engineering, to say nothing of physics and chemistry; and it is an interesting question whether modern scientists and engineers, unhampered by the apparent aptness and efficiency of existing techniques, would arrive at anything like the solutions that have been evolved. We feel that the possibilities should be re-explored in the light of modern knowledge, and particularly the question whether various steps in existing processes are not really redundant. More than one witness has reminded us, for instance, that wool fibres are largely parallel when taken from the sheep's back, and that then they are thoroughly disarranged, only to be drawn parallel again in the end.

The differences in machinery used in the various branches of the textile industry are more of degree than of kind, and it is well known that the larger machinery concerns do in fact cater for a variety of textile needs. If the need for basic research in wool textile machinery is as great as we suggest, it must exist equally in other sections of the textile trade. Moreover, until very recently there appears to have been negligible co-operation between textile machinery makers and the Textile Research Associations—indeed the former were not even members of the latter. These facts lead us to believe that in addition to research undertaken by machinery makers on their own behalf it may well be desirable that the textile machinery making industry should set on foot a Textile Machinery Research Association to work in close alliance with the existing Research Associations of the textile trades.

FUEL RESEARCH

RESEARCH on questions of fuel and power has a threefold implication, in relation firstly to the convenience and comfort of operatives, secondly to the abatement of atmospheric pollution, and thirdly to the most economic use of the national coal resources.

Much fuel research work has already been carried out under Government auspices at The Fuel Research Station, the National Physical Laboratory and the Building Research Station, and by certain Research Associations, such as the British Coal Utilisation Research Association. What is required is even closer

liaison with these by way of the Wool Industries Research Association. Other bodies inviting consultation include the British Electrical Development Association and the Illuminating Engineering Society. We have no doubt that on these existing foundations, and given the will, there should be little difficulty in constructing a well-thought out scheme for attaining the desirable ends we have mentioned. A further field in which rapid progress is now being made and which the wool industry would do well to explore with a keener appreciation is that of the control of processes by means of electronic devices.

DESIGN

WE have received no evidence that British Wool textile manufacturers need repreach themselves on the design of the numerous kinds of fabrics which they produce. The suggestion has sometimes been made that they may be too prolific in their designs; but a wide choice and high standard of materials and designs are necessary if British cloths are to maintain their high reputation throughout the world. Further progress in design must be in two principal directions, that of market research and that of art. With market research we have already dealt. On the artistic side of design, we have heard evidence from Sir Thomas Barlow on behalf of the Council of Industrial Design advocating the setting up of a Design Centre in association with that Council.

The idea of such a centre is by no means simply that of the trade exhibition, which is not favoured among wool textile manufacturers; rather is it intended to be a cultural centre with the object of broadening artistic outlook and of combining technical skill in fabric design with the artists awareness of beautiful things. We recommend that the Wool Textile Industry Advisory Committee suggested in Chapter XII below, in co-operation with the Council of Industrial Design, consider the question of setting up a Design Centre for the wool textile industry.

THE UNITY OF RESEARCH AND GENERAL PROGRESS IN THE TEXTILE INDUSTRIES

THE business of constructing fabrics and the like from fibres has rarely been one in which interest was confined exclusively to a single type of fibre; the technique is similar whatever fibre is used, and variety and design are secured not only by modifications produced with one and the same fibre but also by combinations of different fibres. Modern inventions of new fibres, moreover, are continuously widening the range of possible fibre combinations. Until recent molecular researches, however, it was not clear that the affinity between natural fibres goes far deeper than is perceptible to the naked eye. We know now that they are all formed to a common plan, being constructed from long chain-molecules in much the same way as yarns are constructed from the fibres themselves. This is the lesson of nature, and now that mankind has at last grasped it, the way is open to the scientific production of many new fibres, either by dissolving and regenerating the natural chain-molecules as is done in the manufacture of rayon and artificial protein fibres, or by synthesising new chain-molecules as is done in the manufacture of nylon, and as will be done with ever increasing frequency and skill in the new textile era upon which we seem to be entering. The molecular structure of fibres is a single indivisible study, and the problems of research into natural, regenerated, and synthetic fibres are all fundamentally related. They are no more than variations on a theme that is the common

interest not merely of all textile scientists and technologists but of biologists and medical people besides. No reason remains therefore for perpetuating artificial partitions. There is so much knowledge in any one section of the textile industries that is to the advantage of others and so much to be gained if knowledge of all future discoveries is quickly diffused and becomes common property, that it is time for the textile industries to pool their ideas and research. Once they have joined forces they can look forward to reaping in common the scientific and technical harvest that is in prospect.

Such is the speed of scientific advance that almost anything may happen in textiles, and it is dangerous to assume a permanent demand for existing materials, processes and products. Firms that have prospered with one fibre would be ill-advised to ignore the possible use of others unless they are content that someone else should seize upon new discoveries. The wise textile manufacturer will always look carefully around to see how he may adapt his machinery and processes to whatever the future may bring forth.

Because of the need for unity in research into textile fibres of all kinds we favour the setting up of a National Textile Research Council for the whole of the textile industries. Its function would be to co-ordinate all fibre studies, wherever carried out. It should work in the closest possible collaboration with the Textile Institute and the Society of Dyers and Colourists. It would include representatives both of the employers and the work-people, and also independent members, but above all it should be of the highest scientific standing.

CONCLUSIONS AND RECOMMENDATIONS

THE funds that have so far been available for research are quite inadequate. (*Page* 103.)

There is great need to co-ordinate all wool research activities along lines of co-operation and trust (*Page* 103.)

A Joint Advisory Wool Textile Research Council should be set up with the object of securing that the various needed types of investigation should be covered by the appropriate bodies, and of encouraging co-operation. It should attempt to find an acceptable solution of the problem of secrecy of results. (*Page* 105.)

Of the projected annual levy for general research purposes two thirds, or roughly £100,000 per annum, should be allocated to scientific research. Of this amount up to 25 per cent should be used to meet University and Technical College needs and should be administered by the Research Council, the rest being devoted to the Wool Industries Research Association. (*Page* 106.)

The Research Council should invite other allied industries to co-operate in research not confined exclusively to wool and to contribute to its cost. (*Page* 106.)

From the accumulated balance of the former Encouragement of Exports Levy a sum in the region of £100,000 should, if it be practicable, be allocated to scientific research and administered by the Research Council in the same ratio as the part of the annual levy so allocated. (*Page* 106.)

The present tendency towards developmental experiments as joint efforts of research centres and individual firms should be fostered. The Research Association should have at its disposal greater facilities for practical experimental testing of suggestions and for general experimentation on problems

of production. These facilities could take the form either of development units or of other necessary plant housed in suitable premises. (*Page* 107.)

The present buildings of the Association should be replaced when possible by a new research station. (*Page* 107.)

Increased efforts should be made to raise the level of textile education and more careful thought given to all questions of liaison and the interpretation of scientific results in the language of the factory. There is room for inclusion on the management or staff of firms of persons suitably trained for this purpose. (*Page* 108.)

Technical colleges should be better equipped; Bradford College should, in any re-organisation of the kind envisaged in the Percy Report, be given a status more in keeping with the industrial importance of the locality it serves. (*Pages* 108 *and* 109.)

Fundamental research should be undertaken in the design of textile machinery and in addition to research undertaken by machinery makers on their own behalf it may well be desirable that the textile machinery making industry should set on foot a Textile Machinery Research Association to work in close alliance with the existing Research Associations of the textile trades. (*Page* 109.)

Closer liaison should be established with existing research and developmental institutions concerned with problems of fuel and power, to promote increased efficiency, convenience and cleanliness. (*Pages* 109 *and* 110.)

The suggested Advisory Committee for the Wool Textile Industry, in co-operation with the Council of Industrial Design, should consider the question of setting up a Design Centre for the wool textile industry. (*Page* 110.)

The time having come for the textile industries to pool their ideas on research, a National Textile Research Council should be set up for the whole of the textile industries. (*Page* 111.)

CHAPTER XI. STATISTICS AND COSTING

I. STATISTICS

BEFORE the war the published statistics of the wool textile industry were similar in scope to those of most other British industries, and showed similar deficiencies. The main source of information was the quinquennial Census of Production, supplemented after 1932 by the Inquiries made under the Import Duties Act. The Census of Production provided detailed information about the value and quantity of output, the value and quantity of materials used, the consumption of power, the numbers employed, and the size of firms; but there was no obligation to supply information about machinery and plant. The results of the enquiries of the Census of Production and the Import Duties Act Inquiry were published so long after the period to which they related that they failed to provide information of current use to the industry.

With regard to current statistics, the Imperial Economic Committee published full information in its monthly Wool Intelligence Notes about wool movements in all countries, and was successful in obtaining monthly returns of stocks of wool in public warehouses and in port and railway warehouses in the United

Kingdom. The latter figures, however, excluded stocks in the hands of merchants and users, and consequently could not be taken as an index of total stocks. The Ministry of Labour issued detailed information about the labour position, including figures covering a substantial proportion of the industry and showing numbers employed in various districts and various sections, total wages paid, and the average amount of short time and overtime.

There were virtually no published figures of machinery activity, production, and consumption. Such partial figures as were obtained were circulated only to the members of the trade associations who made returns and were treated as confidential. The figures collected included monthly returns of the activity of combs, rag-pulling machines, carding sets, spindles, and looms, as well as of the weight of wool put through the combs and the production of tops and noils.

This lack of current data compared very unfavourably with the position in the United States, where a wealth of information was published about machinery activity, consumption, stocks, and orders on hand. It also compared unfavourably with the position in some Continental countries. The post-war trend of events is indicated in France, where monthly figures are now available showing the consumption of raw material in worsted spinning and woollen spinning, the production of worsted yarns and woollen yarns, the consumption of yarn in weaving, the production of blankets and fabrics, machinery activity, labour force, total number of hours worked, and total wages paid.

We attach great importance to the collection and publication of information bearing on the state of the industry. We appreciate the anxiety of firms to free themselves from the burden of form-filling; and we realise that there are limits both to the details that they can supply with speed and accuracy and to the amount of tabulated matter that they can digest. But we are strongly of the view that there is need for fuller statistics than were available before the war. We think that it is highly desirable that accurate and up-to-date information should be published on machinery activity, consumption, production, and stocks, and on employment, hours and wages. Without such information, the industry cannot properly assess the course of trade, and the Government and the public at large will lack the full knowledge on which a general economic policy must be based. It is reasonable to hope that better and earlier information will help to eliminate irrational fluctuations in price and output, and will contribute to stability by giving longer warning of changes in store.

If statistics are to contribute to knowledge and stability, they must be freely and quickly published. Statistics thrive on comparisons: they need interpretation, discussion, and criticism.

During the war the Wool Control has been responsible for the regular collection of statistics of production, consumption, machine activity, employment, and stocks. Before the Control is wound up, it will be necessary to decide which of these series should be continued, what changes should be made in any of them, whether they should be supplemented in any way, and who is to assume responsibility. The industry is alive to the need for action and the trade associations are willing and indeed anxious that the opportunity for improving the statistics of the industry should not be lost. Consultations have taken place between the Wool Textile Delegation and the Board of Trade to ensure that the figures which it is proposed to collect monthly are sufficiently comprehensive, without imposing an unnecessary burden on the industry.

The proposals put forward by the Wool Textile Delegation are reproduced

at Appendix V. They are most comprehensive and in line with our own recommendations. We think it highly desirable that arrangements should be made as soon as possible for giving effect to these proposals.

In addition to figures collected from the trade as a whole, provision should be made for special returns on subjects of particular concern to individual districts or areas.

We should like, in passing, to draw attention to the special importance of the information on stocks which it is proposed to collect. In peace as in war records of stocks are cardinal to any forward planning of production. We agree that it would be unreasonable to ask for statistics of physical stocks more frequently than once, or possibly twice a year. As stocks of raw wool are usually at a minimum in the last quarter of the year, we believe that this would be the appropriate season at which to obtain the figures, rather than in June, when the speed with which imports are arriving from overseas may make interpretation difficult.

We should also like to draw attention to the need for full information on the stocks held by the Joint Organisation. A first statement has already been made in admirable detail and we presume that this will be followed by similar statements at regular intervals.

It has been suggested to us that the Wool Textile Delegation may have difficulty in obtaining returns promptly from its members without statutory powers. It is to be expected that there will be a few laggards and dissenters, but we do not on this account favour the grant of statutory powers. Not only would such a concession be unprecedented, but we believe that it would be wrong in principle to apply compulsion while there are prospects of obtaining adequate information by voluntary methods. The Wool Textile Delegation is representative of all sections of the industry and is certainly in a better position than the Board of Trade to educate the industry in the uses of the information which it is proposed to collect. If, however, the Wool Textile Delegation fails to interest a sufficient number of its members in making prompt and regular returns, we agree that the Board of Trade should consider what further powers are required.

The statistics collected by the Wool Textile Delegation would be published, and would be available to the Trade Unions and to the general public. It might be advantageous for the figures to be incorporated with such other information and comment as is thought advisable, in a regular Bulletin.

Apart from the collection of more current data, there is need of fuller and more regular analysis of the general trends in the industry. Without a periodic survey of economic developments affecting the organisation, efficiency and prospects of the industry, it is difficult to detect the underlying trends by which policy should be shaped and guided. We suggest, therefore, that an annual survey should be prepared and published.

There ought therefore, in our view, to be a Standing Statistics Committee associated with the Wool Textile Industry Advisory Committee which we later suggest. Before the war, a Wool Statistics Advisory Committee was attached to the Imperial Economic Committee. We have in mind, however, a body in closer touch with the workings of the British Wool Textile Industry, and in contact also with similar committees for the other textile industries.

We have in mind also that the proposals to spend large sums on market research, out of a statutory levy, will necessarily bring into existence a staff

trained in the use of statistics and with a background of knowledge similar to that required for the preparation of an annual survey. Furthermore, it will be necessary, in order to give effect to some of the recommendations made earlier in our report, to pursue various statistical enquiries, especially in connection with costs of production and output per head. For this purpose, too, a small permanent staff will be necessary to conduct sample investigations and to report on the problems referred to them.

The Standing Statistics Committee should be kept as small as possible and should include not only representatives appointed by the Wool Textile Delegation but also representatives of non-federated firms, together with statisticians and possibly an official representative to provide a liaison with Government departments. It is desirable that the Committee should also include a representative of the Trade Unions, who would be expected to take a special interest in labour statistics.

The functions of the Standing Statistics Committee would be :

(*a*) To advise the Government on all questions involving the collection, publication, and analysis of statistics on the wool textile industry, including, for example, the Census of Production, the monthly and annual Trade and Navigation Accounts.

(*b*) To advise upon the collection of current statistics along the lines already recommended by the Wool Textile Delegation.

(*c*) To co-operate with the Export Corporation in general market research of a statistical character.

(*d*) To supervise the preparation of an annual survey of the industry.

(*e*) To initiate special enquiries.

(*f*) To act as a link with other similar advisory committees under the general Textiles Advisory Council suggested in the last Chapter.

2. COST AND PERFORMANCE DATA

WE have considered the state of cost and performance records within the industry. We have also considered the possibility of a greater degree of uniformity in system and terminology, and of preparing standard cost figures for operations and products in each section of the industry.

We find that there is a growing realisation stimulated by wartime experience, of the need for accurate cost data. The installation and operation of systems however, has been retarded by wartime shortages of staff and trained professional services.

There is a general consensus of opinion that a system which provides a standard cost for each process and which permits the compilation of unit product costs is of great assistance to efficient management. Many mills have also developed a system of cost control by which the expenses, the activity—in terms of running hours—and the performance—in terms of volume of output per running hour—upon which the standard costs have been computed are reconciled with the actual expense, activity and performance.

Apart from the collection of costs for special purposes, (e.g. Government contracts and price regulation arrangements), and subject to what is said below, there is still much to be done in the way of compilation of standard, and even average, costs for each section of the industry, both to enable each firm to measure and improve its own efficiency and for other purposes. We feel that there is

considerable scope for the various Trade Associations to collect cost and performance data and, with suitable safeguards, to make the figures available to their members.

We understand that at least one Trade Association (the Heavy Woollen District Manufacturers' Association) is attempting an experiment on these lines and has engaged the full-time services of a cost accountant with a view to obtaining from, and issuing to, the member firms comparative figures of process and product costs.

Before the war another Trade Association (the Worsted Spinners Federation Ltd.) had a series of cost investigations undertaken on the minimum conversion costs at which a plant could work economically. The unit costs were issued to the members as representing the costs of highly efficient plant at full capacity and at varying lower activities. These costs were intended to be regarded as minima for the purpose of calculating selling prices. No details of the departmental build-up of costs were given, the purpose being rather to provide an overall cost target and a selling price basis.

Given intelligent classification of firms within each section of the industry, much can be gained by each firm knowing how its own technical and cost performance compares with that of:

(*a*) the average of all comparable firms.

(*b*) the average of, say, the three most efficient firms in terms of cost.

The ideal to be aimed at was well stated by one of our professional witnesses—" to identify, record, and suitably present to all firms in the section of the industry concerned, the best achievements in the matter of performance and costs. Each firm would thus be able to see and be reminded at short intervals of its performance and costs relative to the average and the best results in the industry."

Such a scheme would involve the member firms in installing and maintaining a system, uniform in conception, method, and terminology. The details would naturally vary considerably between different sections and between different firms within the same section, but there is sufficient common ground to allow of uniformity in system.

For example, a number of vertical type woollen manufacturing firms may be broadly competitive without necessarily making the same types of cloth, or having identical series of departments. Yet all have to card and spin their yarns, weave, scour, mill, and finish their cloth, and the costs per carding sett hour, per 100 spindle hours, per loom hour, etc., are matters of common interest to them, as is also the performance in terms of output from those productive centres. Where the products are more strictly comparable, e.g. the spinning of white botany yarns, the additional knowledge of the average costs for the various counts of yarn, with details showing how such costs are built up in terms of process or departmental costs, would also be of common interest and value.

Such costs must be adjusted to a common basis of machine activity, with supplementary information on costs at varying levels of activity. This involves a careful division of expenses into those which are fixed irrespective of the degree of machine activity, and those which vary either directly with changes in activity or at certain stages of alteration in machine activity.

In its own interest every firm would require this information in order to measure the effects on its costs of increased or reduced machine activity. In the common interest these adjustments would have to be made in a uniform manner in computing figures for issue to the trade generally.

We believe that it is not sufficiently realised that the modern techniques of obtaining and using cost and performance data are not alternatives to the technical skill resulting from decades of intimate experience of dealing with material, men, and machines, but are complementary to such experience.

CONCLUSIONS AND RECOMMENDATIONS

ACCURATE and up-to-date statistical information should be published on machinery activity, consumption, production and stocks and on employment, hours and wages. Effect should be given as soon as possible to proposals put forward by the Wool Textile Delegation. (*Pages* 113 *and* 114.)

Particulars of stocks of raw wool should be collected in the last quarter of each year. (*Page* 114.)

It will be desirable that the Joint Organisation should follow its recent statement on stocks by further statements at regular intervals. (*Page* 114.)

Unless the contrary should prove necessary statistics should be obtained by voluntary methods. (*Page* 114.)

There should be a Standing Committee on Statistics. (*Page* 114.)

This Committee should, *inter alia*, supervise the preparation of an annual survey of economic development. (*Page* 115.)

It would be of great assistance to efficient management, if the individual mill made use of a system which provided a standard cost for each process and which permitted the compilation of unit product costs.

Accounting for cost and control of cost should be developed and consideration given to the adoption of uniform methods of cost recording and presentation within each section of the Industry.

The adoption of uniform methods would enable standard or average costs, or both, to be computed on a common basis throughout each section of the trade. The various trade associations have considerable scope to assist improvement in the efficiency of the industry, through the collection and interpretation of cost and performance data, and, with suitable safeguards, to make the information available to their members. (*Pages* 115 *and* 116.)

PART V

General Questions of Future Organisation

CHAPTER XII. THE FUTURE ORGANISATION OF THE INDUSTRY

THE RELATION OF EMPLOYERS WITH ONE ANOTHER

THE industry is fortunate in the existence of strong and comprehensive associations of employers in each of its chief sections. A very high proportion of the firms—normally about 90 per cent—belong to a Federation. The four largest of these are the British Wool Federation, Wool Combing Employer's Federation, The Worsted Spinners' Federation Ltd., and the Woollen and Worsted Trade Federation. The first of these has a membership of over 500 firms of topmakers, merchants, brokers, importers and agents and also admits some smaller sectional federations, thus covering a high percentage of those engaged in the raw material section of the trade. The Wool Combing Employers' Federation covers through its members, 90 per cent of the combs owned by commission combers and topmakers, The Worsted Spinners' Federation Ltd., some 93 per cent of the spinning spindles in the industry, while of the manufacturers eligible for membership of the Woollen and Worsted Trade Federation, members own 90 per cent of the looms.

Before the war, the Federations covered a much smaller proportion of the firms in the industry, but we hope that the greater strength that they have since acquired will be maintained. The associations are particularly necessary in view of the large number of relatively small firms in the industry, and because of the wide variety of processes and products. The Federations, moreover, are less likely to engage in price fixing and other semi-monopolistic practices, because of the keen competition that such a large membership necessarily involves and (except for fixed prices for certain commission processes which we have already referred to in Chapter IX) we are unaware of any price agreements that they have prepared. The Worsted Spinners' Federation, in pre-war years, made certain recommendations to member firms as to the costs that would have to be recovered in each department, even by an efficient firm; although this was done with the object of stabilising prices, it could hardly be regarded as monopolistic in character; on the contrary, it was calculated to raise the general level of efficiency in the industry by setting a target for all firms to strive after and by underlining the importance of accurate knowledge of production costs.

The Wool Combing Employers' Federation in 1933 formed a company known as the Wool Combers' Mutual Association Ltd., with the object of limiting redundancy. This Company obtained its capital by an issue of debenture stock secured by levies on the output of each member, and employed the capital to acquire and dismantle combing plants as they came on the market. This was, however, a voluntary arrangement and was not such as to reduce combing capacity beyond the level necessary to meet requirements.

These activities of the trade associations are cited not as an indication of the

typical functions that were discharged, but to show that, even in those sections where restrictive practices could have crept in, there was no evidence that the Federations used their powers in an anti-social way.

The main functions of the Federations were those of the normal trade association: to represent the joint interests of their members to Government departments and the general public, in research projects, in dealings with the trade unions, and so on. We have had every indication that these functions were discharged with ability and with advantage to the industry as a whole.

In an industry with such widely different interests there is necessarily some tendency to sectionalism unless a strong central organisation exists. In the sections of the industry organised on a horizontal basis it is particularly important that problems affecting each successive process should be viewed as a whole, and that it should be possible to take joint action to meet a new development (e.g. in machinery, in raw materials, or in public taste).

The present central body is the Wool Textile Delegation, which came into existence in March 1919 and includes representatives from each of the main trade associations including Scotland and the West of England but excepting the Commission Dyers and Finishers. The Wool Textile Delegation does not itself engage in negotiations with the trade unions on wages and conditions of work, as such negotiations are handled by the parallel organisation of the Wool (and Allied) Textile Employers' Council. This Council has a similar membership, except that it does not cover Scotland and the West of England both of which have their own employers organisations which fulfil this function. The Wool Textile Delegation through the main Trade Associations is allied to the Federation of British Industries and the Wool (and Allied) Textile Employers' Council to the British Employers' Confederation. The strength of the central organisations of employers as represented in the Wool Textile Delegation and Employers' Council is a valuable asset to the industry and should be maintained.

THE ORGANISATION OF WORKERS IN TRADE UNIONS

WITH one exception all the unions catering for the wool textile industry are affiliated to the National Association of Unions in the Textile Trades. The largest union, whose membership covers workers in occupations where apprenticeship is not required, is the National Union of Dyers, Bleachers and Textile Workers, which was formed in 1936 through the amalgamation of three of the largest unions. Their membership represents over 71 per cent of the total in the National Association of Unions in the Textile Trades and is drawn from the whole of the East and West Ridings, the West of England and Scotland. The union has also district offices in Lancashire but these cover mainly the cotton industry.

The remaining unions affiliated to the National Association of Unions in the Textile Trades, with the exception of one operating in the Saddleworth district, are comparatively small and cater mainly for craftsmen such as managers and over-lookers, warp dressers, twisters, loom tuners, etc.

There is also affiliated to the National Association of Unions in the Textile Trades an organisation known as the Scottish Council of Textile Trade Unions which covers all branches of the textile industry in Scotland.

The National Association of Unions in the Textile Trades is the co-ordinating body for the Textile Trade Unions in negotiations with the Employers' Council but on all matters other than national agreements covering wages, hours, holiday pay and overtime rates each union has local autonomy. It is also the National

Association of Unions in the Textile Trades that engages in discussions with the Employers' Council on such matters of national interest as juvenile recruitment, rehabilitation of disabled persons, etc. The existence of a strong co-ordinating body on the workers' side is helpful to the smooth running of the industry. The strength of the central organisation of workers, either in its present or in some more closely co-ordinated form, should be maintained.

In woolcombing a number of workers, but not overlookers and warehousemen, are members of the National Union of General and Municipal Workers which unlike the National Association of Unions in the Textile Trades caters for workers in many other industries.

JOINT INDUSTRIAL COUNCILS

AFTER the first world war a Joint Industrial Council was established in the industry but ceased to function in 1929–30 except in the West of England where it still continues.

STRENGTHENING THE ORGANISATION OF THE INDUSTRY

WE have considered what should be done to strengthen the existing organisation from several points of view.

(a) *The possibility of combination between small firms*

Many factors have limited the growth of the business unit in the industry, and there are a large number of small firms in each section of it. The proper inferences to be drawn from this situation have given rise to much discussion.

So far as cost only is concerned, we have no indication that there is a marked difference between large and small firms. The figures of the net value of output per head and of costs per unit of output quoted in Chapter VII do not tell in favour of firms of any given size; and it may be that it is not so much the size of the firm as the capabilities of the management that accounts for the variations in cost between the firms in the industry.

We have also had evidence to suggest that weak selling in the industry is at least as frequently due to pressure from large firms with high standing charges as from small firms seeking to make a market by undercutting their competitors.

On the other hand, there is reason to believe that the large firms have more frequently been the pioneers in developing export markets, in improving amenities, and in carrying on or backing research projects. The smaller firms have the advantage of providing a stepping-stone for new firms entering the industry, assisting in the promotion of new ideas and maintaining a variety in the final product that is of value in supplying export markets. We believe, however, that the larger firms are also capable of providing a ladder for able men and that there is no lack of firms to maintain the stream of new ideas and a wide variety of product.

We have had no conclusive evidence that welfare arrangements are on the average less good in small than in large firms. It is nevertheless true that the provision of adequate welfare facilities often presents greater difficulties in the smaller units. We suggest, therefore, that small firms would be wise to review these facilities and, particularly where a number of small firms operate in a single large building, examine the possibilities of co-operative welfare arrangements. We understand that some steps in this direction have recently been taken or are planned.

The evidence we have obtained does not justify us in writing dogmatically

on this subject. We have not been able to secure much statistical or costings material on which we might have formed a definite judgment but we think that the matter would be suitable for further investigation since it should be possible to obtain reliable data for full comparison.

(b) *The possibility of a change in the structure of the Woollen and Worsted Sections of the Industry*

We see no reason to suggest any alteration in the present structure of the woollen and worsted sections on vertical and horizontal lines respectively.

(c) *The recruitment and training of the Management in individual firms*

The managements of the firms in the industry tend to be drawn almost exclusively from persons brought up in the industry and, especially in the small private concerns, from families with a proprietary interest. The tradition of the small private firm has many advantages. It means amongst other things a bond of common understanding between the employer and his workers, most of whom are known to him personally. On the other hand it may limit the opportunities for promotion for men of ability, and the ease with which able men with experience in other industries can be attracted to the wool textile industry. Employers in the industry, because of the international connections that manufacturers and merchants form, have generally a wide view of economic trends. We have already referred to the need for intensified training to enable managers to take full advantage of advances in scientific knowledge and technique.

We attach great importance to a well trained management and to the employment of an adequate number of scientists and technicians. We do not fail to recognise the large amount of ability to be found throughout the industry. At the same time the industry should always make the maximum use of the local talent available to it. A proper quota of the more able men with scientific training should always be available and boys leaving secondary schools but not proceeding to technical colleges need to be attracted in adequate numbers. To the extent that these objects have not been fully attained in the past in the case of scientists—and evidence which we have received suggests that there has been some lack—the position needs to be corrected. As we have indicated in greater detail in Chapter X, it will also be increasingly necessary for the managements to be themselves capable of making full use of the technical data provided by scientific research, and they should be alive to the opportunities that such research holds out.

THE RELATIONS BETWEEN EMPLOYERS AND WORKERS

THE responsibility for managing the mills must rest with the management. There are, however, other responsibilities that necessarily rest with the management in an industry organised on a democratic basis. If a common objective of efficient full employment is to be faithfully pursued, there should, in the first place, be arrangements at all levels for full and regular consultation between management and workers. Such consultation should cover all questions of productive efficiency, working conditions, welfare and other matters that are not already the subject of collective bargaining between employers' organisations and trade unions. The existing channels of negotiation on questions of wages, hours and allied matters should be continued.

There should be ready means of access for the workers to the management

in each firm on matters affecting the contentment of the workers', production and the general prosperity of the business. Methods should be available of joint consultation in the factory at which employers and workers meet to discuss their problems; the precise method adopted is of less importance than the existence of an access which the workers feel to be readily, receptively and fairly accorded. That workers can talk freely to the management is important not merely for the contentment of the workers; it goes to the root of the productive efficiency of the industry.

Discussions are about to take place between the Employers' Council and the trade unions on the recruitment, education and training of operatives. A Joint Committee, as already mentioned in Chapter VI, is engaged in examining various aspects of the provisions of the Factory Acts relating to working conditions. There has been recent joint consideration of questions affecting disabled persons and apprenticeship, and a joint appeal has been issued in regard to absenteeism. In general, the existing machinery for joint consultation is adequate in matters of this general character, but we stress the importance of the right being recognised for either side to be in a position to arrange for a joint meeting to be called at the earliest possible date when desired.

A JOINT ADVISORY COUNCIL

ARRANGEMENTS for regular consultation on the basis of a common objective of full employment should be at all levels including the factory, the district, the regional and the national level. They should be such as to enable the workers to participate in discussion of such general questions, arising from time to time, as have been reviewed by this Working Party. We have considered whether at the national level this object should be effected through the medium of meetings between employers' associations and the trade unions or whether there is need for the institution of an Advisory Council including representatives of employers and of workers and persons of experience in other fields, which would undertake this general advisory function.

The wool textile industry is a very important and interesting industry, but its special problems are not distinctive or unique. The same question must therefore arise in other large industries producing consumer goods, and as it seems to us, it requires a decision by Government on uniform lines and on the basis of a wider body of evidence than is at our disposal.

We should assume that an advisory body for the wool textile industry would have its counterparts in other similar bodies for major industries in the textile sphere. We envisage that such a body at any rate for the wool textile trade should consist of representatives of employers and of workers with an independent chairman, and with an admixture of independent members of experience, if independent membership becomes characteristic of such bodies. It would act in a consultative and advisory capacity on questions, arising from time to time, such as have been reviewed by the Working Party. Without impinging upon the natural right of employers' associations and trade unions to make their own representations where necessary, it should become a recognised channel of communication between the Government and the industry on matters which are the concern of the industry.

At the same time we have been impressed in the course of our enquiry by the close relationship of the several industries in the textile and apparel group. Too little regard has so far been paid to this. We should therefore recommend the creation also of an overall Advisory Council for the whole textile and

apparel group to which the advisory bodies (which might be styled Advisory Committees) for the wool textile industry and for the other separate industries in the group would appoint representatives of the constituent elements and which would take in review matters (thrown up to it by the Advisory Committees or otherwise raised) which were clearly of a character closely affecting several or all industries in the group or clearly requiring uniformity of action or method in several such industries. This Advisory Council should similarly become a recognised channel of communication between Government and the industries concerned where joint interests as described above are involved.

The Joint Advisory Wool Textile Research Council and the Standing Committee on Statistics which we have recommended elsewhere would fall into place under the Advisory Committee for the Wool Textile Industry. The Advisory Committee would advise the Board of Trade as to the appropriate distribution (between scientific and market research) of the sums raised by the Statutory Levy. The sums to be devoted to scientific research would be allocated between the various recipients by the Joint Advisory Wool Textile Research Council, whilst those devoted to market research would be allocated to the National Wool Textile Export Corporation. We have recommended elsewhere that the responsibility for the actual collection of the levy should be delegated by the Board of Trade to the Wool Textile Delegation or such other body as the Board may determine. The Standing Committee on Statistics would have the functions listed in Chapter XI. The wider research body which we have recommended under the name of the National Textile Research Council would fall into place under the general Advisory Council for the Textile and Apparel group. We think also that the Board of Trade should give consideration to the inclusion of a representative of workers on the National Wool Textile Export Corporation.

AGENDA FOR DISCUSSION

PROVIDED there is mutual understanding between employers and employed, goodwill on both sides, and agreement on the common objective, there is a large reservoir of productive power in the industry that can be tapped in order to achieve the increase in output which is vital if exports are to be expanded, the standard of life maintained and improved and a policy of full employment achieved.

On the side of the employers, no information should be unreasonably withheld that would encourage the workers to full co-operation. Equally, there should be a sense of urgency and of anxiety for the public interest on the side of the employers at least as great as any that it is desired to awaken in the workers. The managements should be in contact with the various agencies dealing with research—scientific, market and economic. There should also be a wide interchange of ideas between managements in the same way as normally takes place between persons in professional employment. We understand that the trade associations already advise their members or assist them to obtain advice on general problems of productive efficiency; this is a service that should be encouraged and developed.

On the side of the workers, as suggested in Chapter VI, there is scope for a re-examination of the work-load, particularly in those sections of the industry where new automatic machinery will be installed. There should also be a

sense of common interest in the prosperity of the industry and of common anxiety to overcome the difficulties that are holding up production.

Given these conditions, the first task of the industry must be to plan a joint recruitment campaign designed to bring up the total labour force to 200,000. This would be a target accepted by both sides as one capable of achievement, and capable also of meeting the total burden of demand, provided the efficiency of the industry was increased by all the devices open to management and workers.

The second main task should be to improve both productive efficiency and working conditions. The industry does not lack for examples of the highest standards; and if these standards could be the object of emulation throughout the industry, there would be good reason to expect a large and continuing increase in productivity and an enhancement of its attractiveness to the average worker. These are the indispensable conditions without which the industry cannot flourish.

PART VI

Scotland

CHAPTER XIII. SPECIAL PROBLEMS OF THE INDUSTRY IN SCOTLAND

THE WOOLLEN INDUSTRY IN SCOTLAND

THE Scottish Woollen Industry differs materially from the Yorkshire Woollen Industry, and while much of the report provides points of common agreement and suggestions for development applicable alike to Scotland and to Yorkshire, it is considered desirable to outline the Scottish position and to summarise the results of the enquiries of the Scottish Committee of the Wool Working Party.

The Scottish Industry has a great traditional value to the country based upon the high standard of its products, which are recognised throughout the world. The use of pure virgin wool, almost entirely, differentiates the material from that generally used in the Yorkshire Woollen Industry. Mungo, shoddy, thread waste and other re-manufactured wools do not form a recognised part of the raw materials in common use in Scotland. Raw materials are drawn from all parts of the world, and Scottish manufacturers are always prepared to experiment with new materials, provided they can be described as " virgin wool " or one of the rare hairs.

Specialisation has been developed by various manufacturers in the use of materials—native Shetland wool, cashmere, camel-hair, and Vicuna—producing expensive fabrics, commanding an exclusive market. The high quality of Scottish Tweeds is the outstanding feature of Scottish production—quality based upon selected raw materials, craftsmanship, and skilled designing.

The volume of Scottish production is such that it can readily be absorbed in the home and foreign markets, and consequently due to the cultivation of the markets in foreign countries in the past these products have become widely known and appreciated. This recognition of value combined with the weighty significance attached to articles " made in Scotland " has led to extensive foreign connections as well as to home markets. International trade relations have in the past influenced the welfare of Scottish manufacturers and it is now generally realised that a careful balancing up of home and foreign markets is necessary to secure a reasonable measure of stability in an unstable world.

The location of woollen manufacturing in Scotland is set out in the map (page 231) and may be broadly grouped in six areas :

(1) The border area with Galashiels, Selkirk and Hawick as the larger centres ;
(2) The Hillfoots area with Alva and Alloa as centres ;
(3) The Northern area ranging from Aberdeen to Inverness, and including Elgin, Keith and other smaller centres ;
(4) The Hebrides, with Stornoway as centre ;
(5) Glasgow and the West, and
(6) Carlisle, etc. (included with Scotland for administrative purposes).

This report deals mainly with the first four areas, the firms in the Glasgow and

Western area being engaged in a somewhat different type of production including very light weight cloths for the women's trade, shirting, pyjama and scarf materials, using yarns containing a considerable percentage of cotton.

The distribution of firms and machinery at June 1946 was as follows :—

District	Firms		Spinning Spindles			Weaving	
	Numbers	Per cent	Mule	Frame	Per cent	Looms	Per cent
The Borders ..	47	40	173,274	2,386	61	1,886	43
The Hillfoots ..	9	8	40,123	—	14	183	4
The North	24	20	34,109	1,139	12	526	12
The Hebrides ..	6	5	11,280	1,525	4	2[1]	—
Glasgow and the West	23	20	13,599	—	5	1,509	35
Carlisle, etc... ..	8	7	10,908	624	4	285	6
	117	100	283,293	5,674	100	4,391	100

[1] There are estimated to be about 1,500 treadle looms and a considerable, but unknown, number of hand looms in the Hebrides.

The concentration of firms in the Borders has led to the recognition of Galashiels as the main centre of the industry, and here is located the Scottish Woollen Technical College recognised and financed partly by the Scottish Education Department as a Central Institution and partly by the industry: it plays an important part in training and development.

HISTORICAL DEVELOPMENT

THE importance of the industry is derived in some measure from the geographical conditions of the country, large areas being suitable for sheep rearing, but unsuited to other development. The domestic needs of the scattered communities in early days together with the local supplies of wool provided cottage industries which have not yet disappeared, and are continued in somewhat primitive conditions, mainly in the Hebrides. The development of mills has followed the general movements of industry brought about by the use of water power, the introduction of the steam engine and the supply of electricity. The factors which have led to the present location of mills are mainly good supplies of soft water suitable for the manufacturing processes, and the traditional associations of labour and craftsmanship in particular areas. It has been represented to us that there are still great possibilities of development of the industry in small towns and villages where, owing to the possibilities of individual weaving, labour can be used effectively, without the aggregation of large numbers of workers in mills. In the efforts to provide for a wider distribution of home industries throughout rural Scotland, this point of view is worthy of careful exploration. There will undoubtedly always be a potential market for high grade specialities produced under other than factory conditions, but their successful marketing may prove the crux of the matter.

To-day we have in Scotland side by side, notably in the Hebrides, highly mechanised mills with elaborate machinery and home workers using traditional methods to secure a major part of or a supplement to their income. The Scottish Woollen Mills on the whole are distinguished by their pleasant environment and good working conditions. Generally there is a happy atmosphere distinct from the smoke and grime of some great industrial cities, and although

workers may themselves be largely unconscious of it, the factory conditions are such as to give a substantial measure of well-being, of real national significance in the establishment of a great body of good citizens.

There is evidence of traditional skill and knowledge amongst the workers, and of capable management and systematic development in many mills. Business enterprise is not lacking in the management, as is shown by the successful invasions of foreign markets. Many mills owe their present position to the outstanding initiative of individuals: the family tradition in ownership and management is strongly evident, and is indeed more obvious in this industry than in almost any other.

Scottish manufacturers in general have depended to a very great extent on foreign markets and it may be that they have done so to their own disadvantage. It is difficult to say whether the production in the 1930s was as great as in the 1890s but most certainly, in the intervening years, a considerable number of firms have gone out of existence, owing largely to the fact that they relied to such an extent on export trade.

Up to the beginning of this century Scottish manufacturers were doing a very substantial business with America but the McKinley tariff practically brought that business to an end and, at that time, there was a serious diminution in the number of people employed in the industry. From the beginning of the century until the outbreak of the first World War Scottish manufacturers switched over to supplying the European markets and a very substantial business had been built up in Europe, particularly in the Germanic countries. After 1918 Scottish manufacturers had again to re-adjust themselves and efforts were made in the early 1920s to get back into the American market, with varying degrees of success. The European market was studied afresh and a considerable business was again built up, but, in the early 1930s international trade began to collapse and, as a result, Scottish manufacturers suffered further reverses.

During the recent war period and up to the present day Scottish manufacturers have met their responsibilities in connection with the supply of war material, Utility cloths, etc., loyally, and as far as labour available would allow. What the future holds is difficult to foresee but it is obvious that, if World trade permits, Scotland will again be a very important factor in the export of high-grade woollen goods.

ORGANISATION

THE distribution of the mills in Scotland already referred to seems to render it unlikely that there will be developed any areas comparable to the West Riding of Yorkshire, with its highly concentrated mill groupings.

This feature is to be welcomed, and the diversity of the industry is one of its most pleasing features. The specialisation which has taken place in the manufacture of specific products is a tribute to individual enterprise and initiative in seeking for the possible uses of unusual and expensive materials—cashmere, etc., and in the development and adaptation of designs suited to the materials and to the markets available.

During the past seven years, Government requirements have been met in the production of standard cloths and equipment, calling for long runs of identical type; but with the passing of these requirements, and the ultimate removal of restrictions, a return may be expected to the highly individualistic

output of various mills in their own lines of activity. In these lines, small units have, so far as manufacturing processes are concerned an unlimited field. Economic considerations impose limits on production, but in general the organisation is vertical rather than horizontal, and the personal and intimate supervision which can be given in relatively small departments is the keynote to the successes of the past, which are likely to persist in the future.

Much may be said about co-operation and co-ordination in marketing, and much may be done in manufacture but the main hope for the persistence of achievement in Scottish Woollens lies in the variety and charm of the many types of product. Fashions tend to change, and the human outlook is seldom satisfied in adopting uniformity in clothing, although styles may be commonly accepted. This is particularly true in respect of women's materials, for while the individuals may love uniforms with their special significance, they generally hate uniformity in private life.

The various collective organisations for operations and organisation touch the industry at all points, although in differing degrees. The main operative body is the National Association of Scottish Woollen Manufacturers, through which tend to come all matters of general importance to the welfare of the industry, and which is the appropriate channel for making representations to Government departments. There is a very close connection in individual personnel between the members of this Association and the other organisations so that the views of the various sections are readily brought together.

There is reasonably close co-operation in all matters affecting manufacture, materials, wages and general organisation. In the realm of sales promotion there is, however, no such strong co-operation, and the various methods of selling, marketing and advertising, which have in the past been successful in many different ways, still form the ground work for a considerable diversity of opinion and practice.

It seems unlikely that sales promotion can become a subject of complete co-operation on a voluntary basis; in this direction a financial linking up between firms interested in similar types of production provides an apparent solution. How far this will be necessary in the future it is difficult to predict, but the pressure of world competition may result in a survey of possibilities with a blending to some extent of individual experience.

THE LABOUR QUESTION

THE shortage of labour which is common to most industries is also felt in the Woollen industry in Scotland. This takes two main forms (1) insufficient supply of female labour and (2) insufficient recruitment of young persons for training and employment in the mills. We have received evidence from representatives of the Ministry of Labour and National Service on this matter, and the various alternative methods which have been tried to improve the situation. The transfer of workers is fraught with difficulties—individuals are not easily moved from their families or their friends—family transfer is practically impossible owing to housing shortage. Young people may in some cases be ready to move from country to town, or from town to city, but generally they are unwilling to move from town to country. Local ties, friendships and family groups form strong links.

The alternative is to bring work or factories to the areas where labour is available, and this is more readily possible for development areas than for others. Some firms have recognised that this forms the only immediate solution for their expansion or even for the continuance of their businesses on the normal level.

Transport of workers by tram or bus has very limited possibilities owing to the scattered population groups.

Hostels for workers have been considered, but the results are not encouraging, as hostel life does not appeal to young people, who may be separated from their friends.

The following Table shows the labour position in July 1946 and the approximate number of work-people needed to operate existing machinery on a single-shift basis :

Town	No. of Firms	Young Persons		Males		Females		TOTAL	
		Employed	Required	Employed	Required	Employed	Required	Employed	Required
Galashiels (including Earlston, Stow, St. Boswells)	19	99	193	737	919	753	1,049	1,589	2,161
Selkirk	7	105	150	580	655	524	738	1,209	1,543
Hawick	7	89	141	420	488	386	518	895	1,147
Langholm	4	28	47	134	145	190	230	352	422
Jedburgh	2	37	62	68	82	72	82	177	226
Peebles	2	100	164	396	425	437	628	933	1,217
Innerleithen	2	3	2	63	73	21	22	87	97
Walkerburn	1	27	39	175	190	150	230	352	459
Haddington	1	68	70	35	39	34	40	137	149
Edinburgh	1	9	9	15	15	28	28	52	52
Glasgow	4	14	29	38	61	59	136	111	226
Hamilton	1	42	65	12	18	43	65	97	148
Paisley	2	10	13	17	35	79	159	106	207
Auchterarder	2	21	30	37	41	51	74	109	145
Alva	5	57	105	124	136	215	326	396	567
Tillicoultry	1	15	26	64	100	106	168	185	294
Alloa	1	34	55	49	41	71	82	154	178
Keith	2	61	84	142	174	141	170	344	428
Elgin	2	52	84	82	94	106	126	240	304
Aberdeen	1	115	175	194	300	267	425	576	900
Miscellaneous	32	233	314	331	432	454	642	1,018	1,388
	99	1,219	1,857	3,713	4,463	4,187	5,938	9,119	12,258

For single-shift working of all departments there is a shortage of about 640 young persons, 750 men, and 1,750 women. Taking sale-yarn spinners separately, the figures are :

	Employed	Required
Young Persons	146	212
Males	637	675
Females	460	543
TOTAL	1,243	1,430

The balance of men and women power is far from being satisfactory and we understand that this matter is under the continuous scrutiny of the Ministry of Labour and National Service. The main shortage of women labour may be in part assisted by the transference of other industries in which man power is more largely required, but otherwise we would strongly deprecate the transfer of

industries to, or the formation of new factories in, those centres already suffering from labour shortage.

Another solution that has been proposed is the extension of work on Commission. This has definite possibilities, but only on a relatively small scale.

The conditions of working, and the general amenities of mills have a definite influence in the attitude of workers, and we view with interest the advances which are being made by the more enlightened firms in the provision of rest rooms, canteens, better lighting and colour schemes in mills. We consider that such amenities should be extended as soon as conditions permit. Other questions of personnel management and interest in workers welfare are also engaging the attention of management in an increasing degree.

As regards juvenile recruitment, the raising of the school leaving age to 15 in 1947, will accentuate the present difficulties. Inducements may have to be offered to young people in the form of pre-apprenticeship training courses as has already been done in the case of the building and engineering trades, and it would no doubt be helpful if the mysteries of woollen production were brought to the notice of young people before they leave school. The rivalry of different branches of industry makes it necessary for definite steps to be taken particularly in those centres where a variety of occupations is possible.

To a considerable extent recruitment of young people has been a matter of family tradition, but there is no longer the very definite expectation of supply in this way. There would appear to be reluctance on the part of parents to encourage entry to an industry which experienced a prolonged depression in the inter-war years. The higher standards of education tend to cause more young people to look for black coated occupations, and there is need for enlightenment of parents and teachers on the general outlook in industrial employment. The training scheme in Galashiels, to which reference is made later, should be a useful factor in placing recruitment on a better basis, but it will be necessary to give the scheme reasonable publicity in the schools.

WELFARE

THE woollen industry is on the whole a very healthy occupation in Scotland. The general conditions of work are good, and it is not a dirty occupation. Many of the operations performed by women are carried out in comfortable conditions, and much is being done to improve working conditions while more is contemplated with the removal of war-time restrictions.

Safety conditions receive adequate attention and supervision, and the evidence we have received from the Factory Inspectors is on the whole satisfactory as regards factory conditions.

Lighting—both natural and artificial—is being steadily improved, and while gas lighting still remains in places, fluorescent lamps of the most recent type have been installed in a number of mills with gratifying success. In one mill the use of vita-glass is being extended and the firm report improved health on the part of the workers as a result. Attention is being paid to brighter and more cheerful schemes of decoration and colour. The interest of workers has been stimulated by allowing them to suggest colour schemes—a very interesting development. The treatment of roofs, walls and floors is also beginning to be a source of pride.

Ventilation and air-conditioning are being improved, and with the exception of steam in dyehouses the conditions are generally free from serious criticism.

In the older mills there is room for improvement in lavatories and washing accommodation. The location of these conveniences is receiving attention, and where remodelling of mills is taking place, this matter is regarded as of first importance. Provision for workers outdoor clothing has received careful attention in some mills, with drying devices for wet garments.

It is now generally the custom to have short breaks of ten minutes in the morning and afternoon, and in one case, at least, the machinery is shut down to give the workers a complete short break; this is possible where electric driving has been installed.

Enquiry has been made as to the incidence of dermatitis, but there appears to be no prevalence of this trouble. Where it has occurred, we are informed, is mainly in the case of older persons entering sections of a mill to which they were previously unaccustomed. There are individual cases, allergic to special conditions, but the only section of the processing which leads to occasional, trouble is in the dyehouse, and here there are comparatively few cases reported.

BUILDINGS

THE older type of three- or four-storey mill is not now regarded as generally suitable, and where extension or remodelling is taking place, single-storey buildings with roof lighting are favoured, although for some departments, two-storey buildings are found suitable.

The main difficulties in the older buildings lie in lighting and machine spacing. On the latter, a Committee now sitting will report in due course, but the structure of the older buildings renders any improvement a matter of difficulty. We have, however, been impressed by the suitable arrangements being made as to spacing and the elimination of overhead shafting in buildings recently erected.

THE SHIFT PROBLEM

THE installation of new and expensive machinery, together with the labour shortage in places, is causing some concern, particularly when working hours are being reduced. In a number of cases increased output to justify overhead expenses calls for more extended use of machinery.

Objections to double shifts are obvious from the workers' point of view, but a judicious use of overtime has been found useful at periods of pressure. If ample supplies of material and labour were available, there is no doubt that double shifts might be operated with advantage and shorter working hours would be justified, but except in a few areas, the present conditions preclude this solution.

There tend to be " bottle-necks " in the flow of work in mills mainly owing to labour shortage of a particular type; this is specially noticeable in Mending Departments. But this matter is not due to defective organisation, and has in some cases been accentuated by the employment of less skilled workers in the earlier processes.

MACHINERY

OUR attention has been drawn to the delays experienced in different mills in the supply of new machinery and spare parts. Some machines have been on order for three years before delivery is made, and quotations for future deliveries are said to be given with as much as four years for delivery. There is no doubt difficulty in reconciling the requirements of different trades

dependent on a limited group of machinery manufacturers but there is a very definite feeling, with which we are in agreement that the export of machinery of the productive type required in the woollen industry, is a matter of grave concern for the future welfare of the industry. If foreign competitors are enabled to be equipped with the most up-to-date plant, while our own mills are kept waiting, our foreign competitors will have an undue advantage in the future.

There are very many examples of machines in active and effective production, which are 60 to 70 years old, but have been modernised in a satisfactory manner. No fundamental changes in the style and make up of woollen machinery have occurred in that period, although greatly improved machines have been installed for some purposes such as drying. We conclude that there is need for closer co-operation between machinery designers and manufacturers and machine users. Steps might well be taken to bring this about, and to encourage the establishment of new engineering firms for the production of textile machinery. Reference has been made to the advantages of eliminating overhead shafting and the extended use of electric power. In connection with the production centre at the Scottish Woollen Technical College at Galashiels (referred to in paragraph 57 below) it is intended that it should be maintained as a well-equipped mill—where the latest types of machines would be displayed in use for the information of mill-owners.

As regards existing mills, there is room for gradual replacements of machinery but in general, sweeping changes are not necessary. The efficiency of the older machines is remarkable, and increased speeds of output are not regarded with favour owing to the deterioration in the quality of the output. There are definite limits on the speed of production owing to the nature of wool, and on this matter, there is room for research, although a considerable body of experience is available in some mills.

Water power, steam engines, oil and diesel engines are to be found in full working order, and whilst the use of electric power is gradually being extended, the need for steam for processing and for heating premises will remain. Opportunities arise for readjustment of plant in existing mills and new extensions, and the most effective balance of water, steam and electric power call for very careful investigation, particularly in regard to fuel economy.

Mention is made in Chapter VIII of the report of the question of priority for the supply of woollen machinery. In this connection it must not be overlooked that Scotland requires new standard looms and woollen spinning mules for increased production, and for the replacement of older machinery. This matter is of equal importance to Scotland with the manufacture of automatic looms, and continuous spinning frames.

Our attention was drawn to the unsatisfactory position in Stornoway, owing to the limited supply of electric power and to the uncertainty of future electrical developments in the Islands. We understand that the attention of the Hydro-Electric Board has been drawn to this matter by the Lewis Association, and there is no doubt that a definition of their future policy is of the utmost urgency to the industry.

DESIGN

SCOTLAND has been noted for its designers, and the upper avenues of opportunity have been opened to many young men engaged in mills through their capacities in this direction. Many of these have found their services appreciated

outside Scotland. The Scottish Woollen Technical College at Galashiels has for many years given notable service in this direction, and has helped to produce the skilled designer. The experience gained has been largely in the mills, and the distinctive outputs of varying types have been the backbone of Scottish production.

Our attention has been drawn by the Scottish Committee of the Council of Industrial Design to the importance of a Design Centre, in accordance with the policy of that body to promote design in its various aspects. If such a design centre for the Woollen Industry is established, it should be closely associated with the industry and its training activities and it would appear that such a centre would most appropriately be linked with developments in Galashiels, the recognised centre of the industry. A forward step has now been taken by the Government in placing funds at the disposal of the Scottish Committee of the Council for this purpose, and an opportunity is thus afforded for developments on lines parallel to the operations of the Department of Scientific and Industrial Research, whereby a research organisation can be conducted provided that funds are forthcoming, from the industry to offset Government grants. This raises the important question of the relation of the Colleges of Art to the training schemes, and it is stated that there has been, in the past, comparatively little influence exerted by the Colleges on textile developments. The selection of suitably qualified and promising young men with practical experience and preliminary mill training, for study at a College of Art would be beneficial and provision for that purpose might well be encouraged in collaboration with the Education Authorities who have power to grant financial assistance.

From such trainees, much might be expected, and the staffing of a Design Centre will ultimately depend for its recruitment on persons having a background of training and experience coupled with an Art School Course.

We suggest that both the selection and further training of suitable young people in Colleges of Art, and the formation of a Design Centre should receive the sympathetic consideration of manufacturers.

The functions of the Design Centre are however based on a wider idea than training only and in it would be found skilled advice on fashion, developments, foreign and home markets, and a full range of journals, magazines and literature. Such a Centre, properly conducted and staffed would benefit the industry as a whole, and its functions might be extended to include research and other activities. Competition in the markets of the future may make a project of this type highly desirable.

Benefit to the industry might also be secured by sending selected persons abroad to collect ideas and to stimulate their activities. The important matter is that there should be periodic opportunities for widening the outlook of designers leading to a realisation of world trends and possibilities.

Individual firms will quite properly wish to keep their latest advances and ideas for special exploitation, but a Design Centre should in no way interfere with this natural procedure.

STATISTICS AND COSTING

EACH firm has its own system of costing, and some uniformity in methods exists through the advice given by auditors and accountants to groups of firms. It is the view of most manufacturers however, that some generalised system of costing might be developed, leaving to individual firms its adaptation to their

own needs. Such a system might well be sponsored by the National Association of Scottish Woollen Manufacturers. In the case of small firms with limited office staff, relatively simple forms will necessarily be applicable. All firms are fully aware of the importance of this matter, but all do not recognise the value to be derived from comparative figures, and the Association might develop a method of supplying information of maximum and minimum costs which, while not disclosing the operations of particular firms would be generally serviceable.

Statistics may be elaborated to a degree where the trouble and cost of collection far outweigh their usefulness. The intelligent utilisation of statistics is unfortunately limited and there is need for systematic instruction in their use. Stress has been laid on the value of periodic surveys and published information designed to give pointers, with explanatory notes, which could be of greater value than continuous returns. There is much to be said for this, and we are of opinion that the National Association of Scottish Woollen Manufacturers should collect and distribute information on a uniform basis.

While certain statistics may be necessary for national purposes, the proposals on Statistics set out in Chapter XI are not entirely suited to Scottish conditions, and tend to be more elaborate than is necessary. In this connection we would point out that Scotland represents from 7 to 10 per cent of the total production of the country, and if one set of statistics only were proposed, the Scottish figures would tend to be swamped. The information derived would accordingly be of no benefit to the individual producer in Scotland.

The same figures are not necessarily required for Scotland as for the West Riding of Yorkshire. Apparently the number of firms who are really interested in direct export is limited, and the markets in which these firms operate are generally different from those for which Scotland caters. The Scottish manufacturer concentrates on export markets where there is a high standard of living, such as U.S.A., certain Continental countries, and South American countries.

In connection with manufacture, certain problems call for close investigation. To render these investigations useful, certain figures of particular interest to Scotland would be periodically required. A typical problem is that of the cost of pattern-making.

Other problems which differ from those in Yorkshire and for which separate sets of figures would be required relate to marketing and to standards of conditions in the mills.

The issue of a periodic Scottish bulletin is recommended; it is realised that this would require suitable staffing at Headquarters.

TRAINING AND RESEARCH

APPRENTICESHIP provides the training for most sections of the industry supplemented by attendance at local classes or at the Scottish Woollen Technical College. The latter is within reach of the more important Border towns, but in other districts there is no corresponding opportunity of Technical education.

Attendance at short full-time courses involving residence away from home is in operation, but only a limited number of young people can be dealt with in this way. Increased attendance at classes will be required by statute when the operations of the Education Act (Scotland) 1945 come into full operation with the attendance of young persons at Junior Colleges from 15 to 18 years of age, and a considerable development of instruction may be expected.

While general and physical education will necessarily form part of all such

courses, provision may be made for Technical instruction, and where local facilities do not exist, periods of residence may be arranged for full-time instruction. If Galashiels is called on to make provision for this, even on a partial scale, very considerable expansion of the College and its activities will become necessary. There may in addition be a natural desire to provide special instruction at suitable centres in the Hillfoots, the Northern and the Hebridean areas.

Meantime, it is proposed to develop a production centre in connection with the Scottish Woollen Technical College, in which up-to-date plant will be operated for productive purposes and where the most modern machinery will be available for experiment and trial. The manufacturers are keenly interested in this development, and with their hearty support, it should provide a fresh outlook on practical training, and should serve to stimulate recruitment to the industry. The College will continue to provide instruction in its various phases, and linking with a Design Centre and a Research Section should provide a first-rate educational centre for all matters relating to the woollen industry.

Research which has been mainly developed at Leeds University and Torridon may be extended, and in Galashiels research bearing upon Scottish problems can be carried on. Whilst fundamental research may be confined in the main to the existing research centres, there are many problems particularly in mill organisation, machinery, materials and processes which can be dealt with at Galashiels.

It is expected that suitable arrangements can be made for a close liaison with other research centres, and that pooling of results will follow. The range of subjects for investigation is very wide, and the value of such a Research Section will lie in part in stimulating firms to a realisation of the problems lying around them, with the solution of which technical advances may be made.

The employment of physicists and chemists on the Works Staff is only possible in the larger works, and the Research Centre will serve to meet the needs of the smaller firms.

Dyeing, humidity, materials, speed of working, use of substitutes, raw materials and machinery all provide lines of work bristling with problems.

The staff of the Research Station may also be able to convey the results of their own work and of that of other research stations to outlying centres by visits and by suitable lecture courses.

This development will call for contribution from the industry, and the basis for an equitable levy has yet to be found. This matter should be treated as one of immediate importance, as the operations involved must be considered as part of a long-term policy in which stability of finance is essential. The recent schemes of grant for Central Institutions from the Education (Scotland) Fund by the Scottish Education Department are on a wider and more liberal basis than those in force hitherto, and full advantage should be taken of such financial assistance.

The concentration of effort on standard and utility products during recent war years has precluded many mills from pursuing their accustomed variety of output, but the experience gained may be turned to account for future use.

Continuance of a national policy on utility products may lead to the adoption of some plans by which the selling of standardised products will be dealt with collectively at a central office, and orders distributed to various firms on a systematic basis, leaving a proportion—possibly two-thirds—of their productive capacity to be arranged to produce their own specialities.

Our attention has been drawn to the serious position of the tailoring-bespoke

trade, and to the almost complete disappearance of apprentices or learners. It is held that high-class tailoring is essential to the welfare of the Scottish Woollen Industry, and that no development of utility styles can replace the need for individual tailoring of the better class. This has been so definitely felt that a scheme for subsidising the training of apprentice tailors is now projected, to recruit 100 apprentices annually. Schools of tailoring have been few in the past, the main school being conducted by the Regent Street Polytechnic in London, where for many years a full-time Trade School was successfully operated. There may be room for a School of Tailoring in Scotland, and this solution may ultimately tend to restore the influx of capable boys to the Tailoring Industry.

It is generally agreed that Scottish manufacturers should make greater efforts to cultivate the home market, in order to ensure stability, since foreign countries cannot be relied upon as continuous markets. These efforts may be stimulated by advertising and the education of the general public to an appreciation of good quality. Exhibitions can be effective in this matter, although it is felt by some manufacturers that such displays produce little, if any, direct selling. It is however necessary to keep Scottish products before the British public, and exhibitions, as one means of achieving this end, cannot be ignored. It follows, however, that collective efforts are necessary and that the individual manufacturer cannot be expected to go to considerable expense indefinitely when he sees no direct result.

MARKETING

THE methods in operation for disposal of manufactured goods vary considerably from local disposal to clients at one end to merchants at the other, who take full responsibility for selling. Individual firms have, however, many differing practices and as there are large and small mills, uniformity in methods of disposal cannot be expected.

The exploitation of the foreign market has been achieved in the past mainly through personal effort, and the visits of principals to home and foreign centres has been one of the most effective methods of securing orders. Larger firms have agencies established in suitable centres at home and abroad, with whom they keep close personal contact. It is not, however, possible to develop this agency system indefinitely, and various world markets providing for relatively small consumption are and must continue to be dealt with by merchants who may be interested in the products of several competing firms.

Much of the trade formerly developed for Eastern Europe was carried on by German merchants, and the connection of the manufacturers with such merchants was close and fruitful. These merchants were engaged in operations in countries outside their own, where it would have been difficult for Scottish manufacturers to penetrate successfully. This type of connection may be revived, but for some time cannot be looked upon as a definite outlet. Efforts to promote markets in North and South America, South Africa and the Colonies will consequently be of increasing importance. Successful co-operation among non-competing firms in establishing agencies abroad have been brought to our notice, and this method is capable of future development.

Direct contact of manufacturers and clothiers has extended and the results have not been unsatisfactory. Modern advances in organisation of the chain system in tailoring have enabled large orders to be placed, but in such cases price considerations have become a dominant factor. Some manufacturers may

well hesitate to unite themselves too closely with such organisations, when they will not have the security for the flow of orders likely to be obtained from their more exclusive customers. The organisation of mill production for large runs of similar materials may conflict with the use of mills for a wider range of products. It is however necessary to recognise that the chain system of retail distribution and the growth of " making up " concerns is continuing to expand.

In Chapter IX of the Report, the importance of travel facilities for foreign and other buyers has been mentioned. There is every reason to stress the urgency of good communications throughout the country. Travelling to Bradford presents difficulties to Scottish manufacturers as well as to travellers from London, and improved railway services are greatly to be desired in order to economise time.

There are varying opinions about the effectiveness of the Scottish Trade Mark, and it is ignored by a number of firms who have their own exclusive markets. The problem requires re-examination in the light of future competition, and we recommend that it should be the subject of careful consideration, in relation to the lifting of war-time restrictions.

THE HARRIS PROBLEM

HARRIS TWEED, has an advertisement value far in excess of almost any other Scottish product. It is unnecessary to go into the reasons for this, but the evidence presented to us in regard to the Islands development has been reduced by the crofters to a call for " more yarn ".

It is claimed that labour is not wanting, but is in excess of its use through want of yarn.

Stornoway provides the spectacle of most up-to-date mills equipped with modern machinery in the midst of a crofter population with 1,500 treadle looms, and an unknown number of other hand looms where a home industry is carried on—unique in character.

The future of the industry is, according to one witness, assured as the surface of the American market has only been scratched. Other views are that a slump may take place when normal conditions return with an ample supply of tweeds elsewhere more suitable for wear on different occasions, while the Harris Tweed is restricted to sports and general purposes.

These and other questions call for further investigation, and the time at our disposal has not enabled us to go into them fully. We are, however, clearly of opinion that the Harris problem is a matter entirely apart from the mainland Scottish Woollen Industry. The traditional value of the tweed, the conditions of life in the Islands, and the part-time service with which it enables the crofter to supplement his income from fishing and farming are of such a special nature that they must be considered apart.

What is definitely clear is that the maintenance of quality production is essential to the continuance of the industry, which enjoys a place in the sun, and that given a continuance of its advertising and publicity Harris Tweed products may continue to rank amongst the precious and unusual things for which people are always willing to pay.

FUTURE ORGANISATION

THE experience gained by the Scottish Committee in the course of their investigations has been valuable in several ways. Opportunities have been provided

for the expression of views by individuals and by firms as to the welfare of the industry and as to future advances. Visits paid to mills have been a source of mutual satisfaction to the members of the Committee, and to the managers and workers whom they have met: questions of organisation and management have been discussed leading to enlightenment on both sides. It is thought that interest in and concern for the future of the industry is generally shared and that some opportunity for a continuance or development of this procedure would be well received. We attach importance to the broadening of outlook and experience of managers and others by visits to centres other than their own.

The central body—the National Association of Scottish Woollen Manufacturers—to which reference has already been made, provides a channel for contact with Government Departments, and through its close contacts with various organisations it acts as a focussing point for the various sections involved.

The proposals in Chapter XII for an Advisory Council require us to consider the Scottish position, and we are of opinion that an Advisory Committee should be set up, concerned with the Scottish Wool Textile Industry, which should include employers and trades union representatives. Such a Committee should act solely in an advisory capacity, and would not be concerned with questions of labour and wage conditions. It should be suitably linked with any corresponding bodies in Bradford, but would be in a position to express the Scottish point of view and requirements. It would provide a central forum for discussion and investigation of matters affecting the Scottish industry, and for making representations to the appropriate Government Department through the Advisory Council.

The Committee should be small in numbers, and its members ought to be appointed for a limited period of three or four years, but in order to secure reasonable continuity in policy, a fraction of the membership might retire annually, and be capable of re-election after an interval of one or two years.

The Committee should meet at regular intervals and should keep in close touch with developments in all sections of the industry including the Technical Colleges, the Research Section and the Design Section. It is important that it should have opportunities to make contacts, visit firms and generally survey the whole field of activity on a national basis.

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GENERAL CONCLUSIONS

SCOTLAND must look to the future for stability in the woollen industry through the production of goods of high quality, distinctive and characteristic. Every advantage must be taken of scientific and technical developments for which an adequate intelligence service must function mainly through the National Association of Scottish Woollen Manufacturers, by the issue of a periodic Bulletin and by lecture courses. Training must be extended to all young workers on a wider basis than hitherto, with the establishment of Junior Colleges.

Marketing must continue to provide a variety of channels involving various methods of approach, direct and indirect, using agents and merchants, but stimulated in a large measure by the visits of principals, to cultivate connections at home and abroad.

Raw materials must be sought from every source and must be applied with the traditional Scottish adherence to pure wool, or to suitable substitutes of

equally high standard. The avoidance of the cheap and poor quality stuff is vital.

Scotland must realise the great value inherited by the industry in the mere words " made in Scotland " and the Trade Mark or other methods that may be used to keep this before the world should continue to be a matter of first-class concern.

Machinery should be gradually replaced where out of date, older factories should be modernised, and as opportunities occur, rebuilt.

Labour employed in the industry must be made more conscious of the whole processes of the industry through educational schemes, and the operation of the mills more thoroughly brought before the public and teachers and parents, so that recruitment may be increased.

The relations of management and staff will be harmonised and expanded by the increased provision of welfare facilities.

To effect those and other desirable developments, a Scottish Advisory Committee for the Wool Textile Industry should be set up.

In conclusion, we desire to express our gratitude to the various organisations, firms and individuals who have given us evidence or enabled us to visit their works.

We also wish to convey our high appreciation of the indefatigable services rendered at all times by our very efficient Secretary, Miss M. C. Wood.

(SIGNED) *January*, 1947.

WILFRID AYRE, *Chairman.*

J. CAMERON SMAIL.

W. H. BALLANTYNE. J. DOUGLAS HOOD.

HUGH CRAIG. W. THOW MUNRO.

JOHN DOUGHERTY. W. QUIN.

MARJORY C. WOOD, *Secretary.*

Postscript

THE interesting report from the Scottish Committee which forms the preceding chapter suggests to us a few further observations, partly comment, partly supplement, before our report is concluded.

A measure of the size of the industry in the various places of production is provided by the figures of insured workers given in Chapter V, Table 33. From these figures it will be seen that the East and West Ridings of Yorkshire normally account for some 80 per cent of the total of insured workers attached to the industry, Scotland for some 7 per cent to 8 per cent and the West of England for some 3 per cent to 4 per cent.

The Scottish Committee have in the main worked separately from the main Working Party and we do not find ourselves in agreement as fully as we could wish with the general tenor of their report. We feel that between the Scottish part of the industry (including the Glasgow District which is only lightly touched upon) and the English part, the difference is less significant than the Scottish Committee judge it to be, and that the Committee may have set before itself a standard of future attainment less rigid than that which we have adopted. For instance, we hope that future concentration on the export trade will not be less urgent in Scotland than in England in corresponding circumstances, and again that the observations on welfare will not diminish the desire of less advanced firms to emulate the standard of the best. On the particular question of dermatitis—within the general subject of welfare—we do not find ourselves in agreement with the Committee and we refer to our statement on the subject in Chapter VI.

There is some divergence of view between the Scottish Committee and ourselves on statistical questions. We start from the view that for general public purposes appropriate statistics should be collected comprehensively on a uniform basis and preferably through a single channel. We agree of course that over and beyond this other statistics not covering the whole island may in given conditions serve very useful purposes.

On the question of education at Junior Colleges under the Education Acts, dealt with in the main body of the Scottish Committee's report and in their conclusions, it will be seen that our report, in Chapter VI, refrains from attempting to foresee the probable future development.

The reference in the Scottish Report (*page* 136) to their export markets cannot of course be interpreted as implying that concentration of the export effort on such countries as U.S.A., South America, etc., is limited to Scotland. The published report of the National Wool Textile Export Corporation for 1944-45 contains Board of Trade figures indicative of the preponderant exports to those countries from England during the export drive in the early stages of the war.

In Yorkshire, where the industry is highly concentrated, firms normally specialising in the production of cloth of the highest class from the best materials, exist side by side with many others wholly or primarily concerned with other ranges of style and quality, all of which have their economic use and purpose. Neither the allusion in the second paragraph of the Scottish Committee's report to the use in England of various types of raw material for various types of product

nor other allusions in their conclusions should be misinterpreted as implying that England does not produce—and produce in large quantities—articles of the highest quality and workmanship; for that would be a very remarkable misconception.

The Scottish Committee having devoted considerable care to the description of localities in Scotland where the industry is carried on, we are reminded to repeat that apart from the great concentration in Yorkshire, other English districts, as a glance at the map will indicate, also make most textile products. We have had this matter constantly in mind and have endeavoured to frame conclusions which are appropriate to the industry as a whole.

A brief reference to the small industry in Wales, with a suggestion as to how it might grow, will be found in Chapter VI. In England by far the most important outlying District is in the West or South-west and is commonly known as the West of England Trade. As briefly mentioned in our covering note we had the advantage of the association with us in our enquiry of a representative of employers and a representative of workers from the West of England. This arrangement was accepted by the region in preference to the setting up of any separate investigation.

References, necessarily brief, to the long and interesting history of the industry in those parts, will be found in the earlier pages of our report. Its present character and extent may be indicated as follows:

There are in all 24 firms in the West of England engaged in the manufacture of wool textiles. Their capital in pre-war years was not far short of £2½ millions and they employed about 6,000 workers.

The industry is located in pleasant surroundings and the amenities in most of the mills are among the best in the industry. There is nevertheless an acute shortage of labour due largely to the dispersal of munitions production that took place in war-time, a dispersal that has since led to the competition of new factories in the wool textile districts.

The products of the West of England Manufacturers are of high quality and great variety and enjoy an international reputation. It is not possible to say exactly what proportion of the output in pre-war years was exported, but it was unusually high for the Trade as a whole, very large quantities being sent abroad either direct or through the Merchanting Trade. During the war this trade was of necessity greatly reduced but is now again expanding and will increase rapidly if licensing restrictions are removed. As quickly as circumstances permit, the industry in this area hopes to revert to its normal channels. In aiming at expansion and regularity in its export operations it will contribute to one of the most pressing problems of the day.

Conclusions and Recommendations

THE following paragraphs gather together the conclusions and recommendations set out at the end of various chapters of the Report up to Chapter XII and includes a summary of part of Chapter XII and a transcript of that portion of the Chapter which does not lend itself to summarising.

CHAPTER III

AFTER the period of re-stocking home demand for finished products may show an increase of up to 10 per cent over the total in a good year such as 1937, but a further study should be made of the probable changes of demand over the next five years. (*Page* 27.)

Though the industry should attempt a higher target a 20 per cent expansion of exports of finished products over 1937 would be no mean achievement. (*Page* 29.)

Taking into account intermediate products a level of demand 10–15 per cent higher in total than in 1937 may be postulated. (*Page* 29.)

The estimate for exports assumes that in forthcoming discussions the Government will seek to secure such reductions and simplifications in trade barriers and limitations on unfair practices as will enable the industry to compete on fair terms. Protection should not be withdrawn in its entirety if the only result were to obtain relatively small concessions, when it would be in the national interest to maintain some protection for the industry. (*Page* 29.)

CHAPTER IV

BRITISH manufacturers must consider how best to use wool offered from the surplus stock held by the Joint Organisation if an abnormal proportion of the current clip is bought by other countries. (*Page* 40.)

Past instability in the price of wool has exercised an unsettling influence over the industry. The most effective contribution to more stable wool prices would be continuous full employment in the world and the absence of inflationary and deflationary movements. (*Pages* 40 *and* 41.)

But improvements and additions to the machinery of marketing may make an important contribution and when the operation of the plan for the Joint Organisation is reviewed in four years time the review should embrace the whole question of the practicability of measures to secure price stability whether by continuing that organisation on a permanent basis or by other means. (*Page* 41.)

The Wool Textile Delegation should give consideration to the formation of a Fuel Efficiency Committee for the whole industry. (*Page* 41.)

CHAPTER V

PLANS should be based on the assumption of a continuing shortage of women workers as compared with the number employed in pre-war years. (*Page* 49.)

The shortage of juveniles is likely to become still more acute. (*Page* 50.)

The numbers in the older age groups are high. (*Page* 51.)

The South West suffered most heavily through the withdrawal of labour during the war. (*Page* 52.)

Every district will have an uphill struggle to attract more labour before there is sufficient to meet even the minimum requirements of the industry. (*Page* 52.)

THE labour force that can be hoped for within measurable distance of time does not exceed 200,000,—a labour force 15 per cent lower than was attached to the industry pre-war though not then fully employed. Taken in conjunction with the probable volume of demand, this implies the necessity to plan for an improvement in productivity in the industry of 20–25 per cent over the next few years. (*Pages* 53 *and* 54.)

The first necessity for the industry is a common objective clearly understood and loyally pursued by employers and operatives and their respective associations and unions and this should be the full and efficient employment of 200,000 workers under fair wages and conditions. (*Page* 54.)

Given acceptance of this objective the necessary improvement of productivity, though it would be reached only by ingenuity, foresight and determination, is not unattainable. (*Page* 54.)

The industry cannot afford absenteeism if its objects are to be attained and avoidable absenteeism should be eliminated. (*Page* 54.)

Steps should be taken to settle one way or the other allegations frequently made that the work-load in various sections, notably weaving, compares unfavourably under equal conditions with other countries and unfavourably with other industries. (*Pages* 54 *and* 55.)

Research regarding the operations performed in the industry, having the object of reducing fatigue and improving output without undue exertion, should be pursued. (*Page* 55.)

Improvements in working conditions under one or more of the heads named below are required in many, but not in all, premises. Under several of the heads conclusions of the Wool Textile Joint Factory Committee will become available in due course. (*Pages* 56 *and* 57.)

Spacing of Machinery. (*Page* 57.)

Lighting. (*Page* 57.)

Temperature, Ventilation and Humidity. (*Page* 58.)

Noise (upon which research might usefully be undertaken). (*Page* 58.)

Individual Electric Drive. (*Page* 59.)

Washing and Clothes Drying facilities. (*Page* 59.)

Rest Rooms. (*Page* 59.)

The establishment of a central cleansing depot for the treatment of rags calls for further examination. (*Page* 59.)

There is need for small firms, both when housed together, and also when closely adjacent, to take joint action to set up canteens and to co-operate in other directions to improve welfare services and medical facilities. (*Page* 59.)

Fuller information on dermatitis in the industry is necessary, and fuller compliance with Factory Department recommendations. (*Page* 60.)

Consideration should be given to weight lifting and weight carrying limitations. Use should also be made wherever possible of mechanical methods of handling. (*Page* 60.)

If it is hoped to attract women with children to the industry the use of day nurseries, with the co-operation of the local authorities, should be encouraged. (*Page* 60.)

Arrangements for the recruitment and training of operatives should be improved in various ways. Two joint committees to consider separate aspects of this matter should get to work at once. (*Pages* 61 *and* 62.)

While the first objective should be to expand output in the existing centres of the industry, yet if events show that the labour force available will be unable to meet the whole normal demand there will be room for a further limited dispersal to other districts (including South Yorkshire and also in a measure Wales) beyond what is already in progress. So far as voluntary dispersal may ultimately prove inadequate, concerted study may become necessary later on. (*Pages* 62 *and* 63.)

There is little ground for diversification of industry in the wool textile centres except that a few alternative industries might be located in the heavy woollen districts of Yorkshire. (*Page* 64.)

CHAPTER VII

INFORMATION on output per man-hour and per machine-hour in the different sections of the industry should be collected. (*Page* 66.)

After making all necessary qualifications—and they are many and important—the high physical output per man-hour in the United States remains striking. (*Pages* 66 *to* 68.)

Comparisons with other foreign wool textile industries should be pursued though with due regard to the highly specialised products of the British industry. (*Page* 68.)

The Party have formed a favourable view of the general level of efficiency of the industry; quantitative tests suggest that the rate of progress has been near the average for British industry. (*Pages* 68 *and* 69.)

There are, however, wide variations in efficiency between different firms in the industry. The standard of the best is well worthy of emulation and if generally achieved would of itself produce a marked improvement of output. In this connection comparisons of cost would be invaluable. (See also recommendations in Chapter XI). (*Page* 69.)

The evidence available is hardly sufficient to warrant any conclusions in favour of the superior efficiency of firms in the larger size groups. (*Page* 71.)

The precise economies resulting from the replacement of standard by automatic looms should be more fully investigated and information should be obtained as to the type of product woven on the looms already in use and the measure of success achieved. (*Page* 74.)

In general the direct savings in production costs from long-runs are rarely large. There are, however, important exceptions especially in weaving and its preparatory processes. (*Page* 74.)

No data are available for comparison of costs in a factory laid out to make the fullest practicable use of automatic machinery and in a factory laid out on normal lines, but fuller information should be collected to establish the possible economies that might result from greater standardisation. (*Pages* 74 *and* 75.)

Fuller consideration should be given to ways in which a larger quantity of materials might be passed through the machines per man-hour; and through the use of appropriate techniques greater attention should be given to long run production of cloth for the home market and for selected export markets to which such a policy could usefully be applied. (*Page* 75.)

Some falling off has been brought about in the quality of utility goods by the inelasticity of price ceilings. This is damaging to the reputation of the industry and should not be allowed to continue. (*Page* 75.)

The issues involved in adapting the utility scheme to meet conditions now developing should be given thorough consideration. (*Page* 75.)

DIFFICULTIES confront the manufacturers of wool textile machinery but are not peculiar to machinery for this industry; light may be thrown by the Evershed Committee upon the action to deal with them. (*Page* 79.)

The needs of the cotton industry (or any other section of the textile industry) should not lead to an encroachment on the limited capacity available for the production of wool textile machinery. (*Page* 79.)

A reasonable number of import licenses for new textile machinery should be granted for testing and some addition to present imports of textile machinery as a whole allowed. Owing to the present long delivery dates, renewals of licenses should be readily granted. (*Page* 80.)

Full information should be obtained on the economies likely to result from the use of larger packages. (*Page* 82.)

Self-doffing machinery should be used as extensively as possible; the development of cap self-doffers should be given high priority. (*Page* 82.)

A close watch should be kept on machinery developments both British and foreign. (*Page* 84.)

There is room for a large extension in the use of automatic machinery, particularly in winding, warping and weaving. (*Page* 85.)

The industry appears to have been very conservative—not unnaturally during the period of depression—in installing new machinery and, especially on the woollen side and in weaving, has not taken full advantage of the developments in technique. (*Pages* 85 *and* 86.)

Intense research and development to improve the performance and extend the range of machinery is urgently needed especially in the next five years so that the industry may profit before its programme of post-war equipment is completed. (*Page* 86.)

Priority should be given to deliveries of equipment that would yield an immediate economy of labour. (*Page* 86.)

The report of the Evershed Committee may be expected to throw light, directly or indirectly, on problems connected with the supply of machinery and meanwhile only tentative conclusions are submitted but collaboration between manufacturers and users should be encouraged and the major problem particularly over the next few years, that of increasing production, would be eased by an increased use of standard parts and a reduced number of types particularly in the manufacture of automatic looms[1]. (*Pages* 86 *and* 87.)

Manufacturers should be encouraged to improve their present buildings, a guide to possibilities being provided by an experiment made by the Employers' Council. There should be some preference for the grant of building licenses and materials for this purpose as soon as possible. (*Page* 88.)

Licenses for the erection of new mills where necessary should be granted as soon as the need for housing has been met. (*Page* 88.)

If practicable within the limits of taxation policy it would be helpful to this industry if certain provisions governing the computation and assessment of Surtax could be modified and if the initial depreciation allowances on new buildings and plant for purposes of Income Tax could be increased to 30 per cent. (*Page* 89.)

It would be desirable that the normal depreciation allowances on new buildings

[1] As to machinery research see recommendations in Chapter X.

and plant for Income Tax purposes should be calculated on the straight line basis. (*Page* 89.)

CHAPTER IX

so long as a shortage of supplies exists, margins for manufacturers, wholesalers and retailers, as in the case of the earlier processes, should continue to be controlled. (*Page* 94.)

The margins permitted to merchants appear to compare favourably with those generally in force in other trades throughout the country. The terms of reference preclude the Party from going into the question of retail margins; but the vast difference between the manufacturer's price of cloth and the retailer's price of cloth and of garments suggests the need for a close examination. (*Page* 94.)

In the normal future manufacturers should guard against seasonal fluctuations by careful planning as between home and export demand. (*Page* 95.)

There should be continuous consultation between the wool textile industry and the British Rayon Federation. (*Page* 95.)

Following efforts now being made, over-measure should be abolished and terms of sale standardised. (*Page* 95.)

Steps can be taken with advantage to curtail the excessive concentration on specialities of pre-war years. Arrangements already in being have been of material assistance in meeting the shortages of labour. The question of standardisation is under joint examination by the Wool Textile Delegation and the British Standards Institution. (*Pages* 95 *and* 96.)

There is scope for consultation between producers of hosiery yarn and the hosiery industry and also between the wool textile industry generally and other consumers, as well as merchant converters and wholesalers. (*Page* 96.)

The National Wool Textile Export Corporation should certainly be continued and expanded. (*Page* 96.)

It should explore the potentialities of export to China and the Dutch East Indies. (*Pages* 96 *and* 97.)

The Corporation should make a full review of the marketing organisation taking into account some of the experiments made during the war. (*Page* 97.)

It should consider whether a special marketing agency should be created to obtain a larger share of the American trade in medium price cloth. (*Page* 97.)

The Board of Trade should give all the help it can in protecting trade-marks in foreign countries. (*Page* 97.)

In the interests of the export trade foreign buyers should have the advantage of more rapid train services and increased hotel accommodation in Bradford and other centres of the industry. (*Page* 97.)

Of the projected annual levy for general research purposes one third, or roughly £50,000 per annum, should be allocated to the Export Corporation, and of the accumulated balance of the former Encouragement of Exports Levy a similar proportion (roughly £50,000) should be used to meet current expenses of the Corporation till the new levy is available and to add to its resources as it is about to launch its new campaign. (*Page* 98.)

CHAPTER X

THE funds that have so far been available for research are quite inadequate. (*Page* 103.)

There is great need to co-ordinate all wool research activities along lines of co-operation and trust. (*Page* 103.)

A Joint Advisory Wool Textile Research Council should be set up with the object of securing that the various needed types of investigation should be covered by the appropriate bodies, and of encouraging co-operation. It should attempt to find an acceptables olution of the problem of secrecy of results. (*Page* 105.)

Of the projected annual levy for general research purposes two thirds, or roughly £100,000 per annum, should be allocated to scientific research. Of this amount up to 25 per cent should be used to meet University and Technical College needs and should be administered by the Research Council, the rest being devoted to the Wool Industries Research Association. (*Page* 106.)

The Research Council should invite other allied industries to co-operate in research not confined exclusively to wool and to contribute to its cost. (*Page* 106.)

From the accumulated balance of the former Encouragement of Exports Levy a sum in the region of £100,000 should, if it be practicable, be allocated to scientific research and administered by the Research Council in the same ratio as the part of the annual levy so allocated. (*Page* 106.)

The present tendency towards developmental experiments as joint efforts of research centres and individual firms should be fostered. The Research Association should have at its disposal greater facilities for practical experimental testing of suggestions and for general experimentation on problems of production. These facilities could take the form either of development units or of other necessary plant housed in suitable premises. (*Page* 107.)

The present buildings of the Association should be replaced when possible by a new research station. (*Page* 107.)

Increased efforts should be made to raise the level of textile education and more careful thought given to all questions of liaison and the interpretation of scientific results in the language of the factory. There is room for inclusion on the management or staff of firms of persons suitably trained for this purpose. (*Page* 108.)

Technical colleges should be better equipped; Bradford College should, in any re-organisation of the kind envisaged in the Percy Report, be given a status more in keeping with the industrial importance of the locality it serves. (*Pages* 108 *and* 109.)

Fundamental research should be undertaken in the design of textile machinery and in addition to research undertaken by machinery makers on their own behalf it may well be desirable that the textile machinery making industry should set on foot a Textile Machinery Research Association to work in close alliance with the existing Research Associations of the textile trades. (*Page* 109.)

Closer liaison should be established with existing research and developmental institutions concerned with problems of fuel and power, to promote increased efficiency, convenience and cleanliness. . (*Pages* 109 *and* 110.)

The suggested Advisory Committee for the Wool Textile Industry, in co-operation with the Council of Industrial Design, should consider the question of setting up a Design Centre for the wool textile industry. (*Page* 110.)

The time having come for the textile industries to pool their ideas on research, a National Textile Research Council should be set up for the whole of the textile industries. (*Page* 111.)

CHAPTER XI

ACCURATE and up-to-date statistical information should be published on machinery activity, consumption, production and stocks and on employment, hours and wages. Effect should be given as soon as possible to proposals put forward by the Wool Textile Delegation. (*Pages* 113 *and* 114.)

Particulars of stocks of raw wool should be collected in the last quarter of each year. (*Page* 114.)

It will be desirable that the Joint Organisation should follow its recent statement on stocks by further statements at regular intervals. (*Page* 114.)

Unless the contrary should prove necessary statistics should be obtained by voluntary methods. (*Page* 114.)

There should be a Standing Committee on Statistics. (*Page* 114.)

This Committee should, *inter alia*, supervise the preparation of an annual survey of economic developments. (*Page* 115.)

It would be of great assistance to efficient management, if the individual mill made use of a system which provided a standard cost for each process and which permitted the compilation of unit product costs.

Accounting for cost and control of cost should be developed and consideration given to the adoption of uniform methods of cost recording and presentation within each section of the industry.

The adoption of uniform methods would enable standard or average costs, or both, to be computed on a common basis throughout each section of the trade. The various trade associations have considerable scope to assist improvement in the efficiency of the industry, through the collection and interpretation of cost and performance data, and, with suitable safeguards, to make the information available to their members. (*Pages* 115 *and* 116.)

CHAPTER XII

THE industry is fortunate in the existence of strong and comprehensive associations of employers in each of its chief sections. (*Page* 119.)

There is every indication that the functions of these associations have been discharged with ability and with advantage to the industry as a whole. Their strength should be maintained. (*Page* 120.)

The existence of a strong co-ordinating body on the workers' side, (the National Association of Unions in the Textile Trades), is helpful to the smooth running of the industry. Its strength either in its present or in some more closely co-ordinated form should be maintained. (*Pages* 120 *and* 121.)

The question of the relative efficiency of small and large firms should be further investigated. (*Pages* 121 *and* 122.)

The Party see no reason to suggest any alteration in the present structure of the woollen and worsted sections on vertical and horizontal lines respectively. (*Page* 122.)

The Party attach great importance to a well trained management and to the employment of an adequate number of scientists and technicians. (*Page* 122.)

The concluding portion of the Chapter which does not lend itself to summarising is as follows:

The Relations between Employers and Workers

The responsibility for managing the mills must rest with the management. There are, however, other responsibilities that necessarily rest with the

management in an industry organised on a democratic basis. If a common objective of efficient full employment is to be faithfully pursued, there should, in the first place, be arrangements at all levels for full and regular consultation between management and workers. Such consultation should cover all questions of productive efficiency, working conditions, welfare and other matters that are not already the subject of collective bargaining between employers' organisations and trade unions. The existing channels of negotiation on questions of wages, hours and allied matters should be continued.

There should be ready means of access for the workers to the management in each firm on matters affecting the contentment of the workers, production and the general prosperity of the business. Methods should be available of joint consultation in the factory at which employers and workers meet to discuss their problems; the precise method adopted is of less importance than the existence of an access which the workers feel to be readily, receptively and fairly accorded. That workers can talk freely to the management is important not merely for the contentment of the workers; it goes to the root of the productive efficiency of the industry.

Discussions are about to take place between the Employers' Council and the Trade Unions on the recruitment, education and training of operatives. A Joint Committee as already mentioned in Chapter VI, is engaged in examining various aspects of the provisions of the Factory Acts relating to working conditions. There has been recent joint consideration of questions affecting disabled persons and apprenticeship, and a joint appeal has been issued in regard to absenteeism. In general, the existing machinery for joint consultation is adequate in matters of this general character, but we stress the importance of the right being recognised for either side to be in a position to arrange for a joint meeting to be called at the earliest possible date when desired.

A JOINT ADVISORY COUNCIL

Arrangements for regular consultation on the basis of a common objective of full employment should be at all levels including the factory, the district, the regional and the national level. They should be such as to enable the workers to participate in discussion of such general questions, arising from time to time, as have been reviewed by this Working Party. We have considered whether at the national level this object should be effected through the medium of meetings between Employers' Associations and the Trade Unions or whether there is need for the institution of an Advisory Council including representatives of employers and of workers and persons of experience in other fields, which would undertake this general advisory function.

The wool textile industry is a very important and interesting industry, but its special problems are not distinctive or unique. The same question must therefore arise in other large industries producing consumer goods, and as it seems to us, it requires a decision by Government on uniform lines and on the basis of a wider body of evidence than is at our disposal.

We should assume that an advisory body for the wool textile industry would have its counterparts in other similar bodies for major industries in the textile sphere. We envisage that such a body at any rate for the wool textile trade should consist of representatives of employers and of workers with an independent chairman, and with an admixture of independent members of experience, if independent membership becomes characteristic of such bodies. It would act in a consultative and advisory capacity on questions, arising from time to

time, such as have been reviewed by the Working Party. Without impinging upon the natural right of employers' associations and trade unions to make their own representations where necessary, it should become a recognised channel of communication between the Government and the industry on matters which are the concern of the industry.

At the same time we have been impressed in the course of our enquiry by the close relationship of the several industries in the textile and apparel group. Too little regard has so far been paid to this. We should therefore recommend the creation also of an over all Advisory Council for the whole textile and apparel group to which the advisory bodies (which might be styled Advisory Committees) for the wool textile industry and for the other separate industries in the group would appoint representatives of the constituent elements and which would take in review matters (thrown up to it by the Advisory Committees or otherwise raised) which were clearly of a character closely affecting several or all industries in the group or clearly requiring uniformity of action or method in several such industries. This Advisory Council should similarly become a recognised channel of communication between Government and the industries concerned where joint interests as described above are involved.

The Joint Advisory Wool Textile Research Council and the Standing Committee on Statistics which we have recommended elsewhere would fall into place under the Advisory Committee for the Wool Textile Industry. The Advisory Committee would advise the Board of Trade as to the appropriate distribution (between scientific and market research) of the sums raised by the Statutory Levy. The sums to be devoted to scientific research would be allocated between the various recipients by the Joint Advisory Wool Textile Research Council, whilst those devoted to market research would be allocated to the National Wool Textile Export Corporation. We have recommended elsewhere that the responsibility for the actual collection of the levy should be delegated by the Board of Trade to the Wool Textile Delegation or such other body as the Board may determine. The Standing Committee on Statistics would have the functions listed in Chapter XI. The wider research body which we have recommended under the name of the National Textile Research Council would fall into place under the general Advisory Council for the Textile and Apparel group. We think also that the Board of Trade should give consideration to the inclusion of a representative of workers on the National Wool Textile Export Corporation.

AGENDA FOR DISCUSSION

Provided there is mutual understanding between employers and employed, goodwill on both sides, and agreement on the common objective, there is a large reservoir of productive power in the industry that can be tapped in order to achieve the increase in output which is vital if exports are to be expanded, the standard of life maintained and improved and a policy of full employment achieved.

On the side of the employers, no information should be unreasonably withheld that would encourage the workers to full co-operation. Equally, there should be a sense of urgency and of anxiety for the public interest on the side of the employers at least as great as any that it is desired to awaken in the workers. The managements should be in contact with the various agencies dealing with research—scientific, market and economic. There should also be a wide interchange of ideas between managements in the same way as normally takes

place between persons in professional employment. We understand that the trade associations already advise their members or assist them to obtain advice on general problems of productive efficiency; this is a service that should be encouraged and developed.

On the side of the workers, as suggested in Chapter VI, there is scope for a re-examination of the work-load, particularly in those sections of the industry where new automatic machinery will be installed. There should also be a sense of common interest in the prosperity of the industry and of common anxiety to overcome the difficulties that are holding up production.

Given these conditions, the first task of the industry must be to plan a joint recruitment campaign designed to bring up the total labour force to 200,000. This would be a target accepted by both sides as one capable of achievement, and capable also of meeting the total burden of demand, provided the efficiency of the industry was increased by all the devices open to management and workers.

The second main task should be to improve both productive efficiency and working conditions. The industry does not lack for examples of the highest standards; and if these standards could be the object of emulation throughout the industry, there would be good reason to expect a large and continuing increase in productivity and an enhancement of its attractiveness to the average worker. These are the indispensable conditions without which the industry cannot flourish.

APPENDIX I

Report on Swedish Wool Textile Mills

Visited by members of the Wool Working Party

OBJECTS AND CONSTITUTION OF THE MISSION

IT is important to emphasize that the object of the mission was not to make an exhaustive and representative survey of the Swedish wool textile industry, but by visiting three of the biggest and best appointed mills in the country, to obtain knowledge which might be usefully employed in this country.

Appointed by the Board of Trade, the mission was led by Mr. R. G. BAILEY, C.B.E., Wool Trade Advisor to the Board of Trade, who was co-opted to the Wool Working Party for this task.

The Wool Working Party members of the mission were :—

MR. G. E. BIRKENSHAW, Vice-President of the Woollen and Worsted Trades Federation.

PROFESSOR W. T. ASTBURY, Leeds University.

MR. PERCY ELLIS, Assistant Secretary of the National Union of Dyers, Bleachers and Textile Workers.

MR. SYDNEY BEDFORD, Secretary of the National Wool Sorters Society.

MR. A. R. BAINES, C.B.E., Deputy Wool Controller, and
MR. R. E. MASTERS, Assistant to Mr. Bailey, were co-opted.

FIRMS VISITED

A/B SKANSKA YLLEFABRIKEN of Kristianstad, woollen and worsted spinners and manufacturers, dyers and finishers.

A/B NYBORGS YLLEFABRIK of Norrkoping, woollen spinners and manufacturers, dyers and finishers.

A/B FORENADE YLLEFABRIKERNA of Norrkoping, woollen and worsted spinners and manufacturers, dyers and finishers.

ITINERARY

THE party left Northolt Aerodrome, London on Sunday August 18th and on arrival in Gothenburg at mid-day was met by Mr. R. G. Bailey, Wool Trade Adviser to the Board of Trade and by Mr. Frans Nilsson.

On Monday August 19th, under the guidance of Consul Skoglund and others, they were conducted round workers' flats and dwellings situated in the textile town of Boras some 40 miles distant from Gothenburg. They made a thorough investigation not only of the houses and flats of workers, but of all the social amenities which had been provided for them, partly by the town and partly by the different mills.

In the early afternoon, the party left Gothenburg for Kristianstad where they were received by Mr. Nils Engberg and his son Kaj Engberg, who, the next day conducted the party round the modernised Skanska Yllefabriken standing on the outskirts of Kristianstad.

On Wednesday the party left for Norrkoping, where they were conducted round the firm of Nyborgs Yllefabrik by the directors, Mr. Sten Nyborg and Mr. Karl Fredrik Nyborg. The next day they inspected the factory of Forenade Yllefabrikerna under the guidance of Mr. Wm. and Mr. Tore Wahren.

The official business of the mission was brought to a close by a visit on Friday to the British Legation in Stockholm, followed by a conference with Mr. O. Thurdin, Managing Director of the Swedish Textile Employers' Association. Members had the Saturday to themselves in Stockholm and early on Sunday returned direct to England by 'plane, having been away exactly one week.

ACKNOWLEDGMENTS AND THANKS

IT should be placed officially on record that not only did the following gentlemen place at the disposal of the mission all the technical, scientific and statistical information in their possession, but also entertained us with unusual hospitality, kindness and courtesy :

Messrs. Nils & Kaj Engberg,
c/o A/B Skanska Yllefabriken,
Kristianstad.

Messrs. Sten & Karl Fredrik & Sten Nyborg,
c/o A/B Nyborgs Yllefabrik,
Norrkoping.

Messrs. Wm. & Tore Wahren,
A/B Forenade Yllefabrikerna,
Norrkoping.

Mr. Frans Nilsson,
c/o Werner & Carlstrom,
Gothenburg.

Mr. O. Thurdin,
Sveriges Textilindustriforbund,
s:a Blasieholmshamnen 4A,
Stockholm.

Mr. Sture Skoglund,
A/B Kamgarn,
Boras.

The Party is sincerely grateful to Mr. Bailey for his great kindness and help during the visit to Sweden. The intimate knowledge that Mr. Bailey possesses of Sweden, the Swedish language and the Swedish people was invaluable. Most of the arrangements and itinerary were arranged by him and through his personal friends in Sweden, and it is quite true to say that due to his kindness, courtesy and careful planning, the visit was an outstanding success.

We also thank most sincerely Mr. Baines for his help and advice.

Mr. R. E. Masters acted as Secretary to the Party and our grateful thanks are due to him for the admirable way in which he collected the data and helped to prepare this report.

1. PRODUCTS

ALL types of woollen and worsted cloths are made by the Swedish mills—men's wear, women's wear, boys' and girls' wear, including sports tweeds and flannels. There is not the same degree of specialisation as is found in Great Britain, the whole gamut of these cloths usually being made in the same factory. According to the admissions of the Swedish manufacturers, the only cloths which they find difficult to make are the more expensive fancy worsteds and woollens in which apparently they cannot compete successfully with British products, despite the prevailing rate of exchange and import duties. Nevertheless, the competition which Swedish manufacturers fear most is not that from Great Britain—because of the increased costs of production now ruling in the United Kingdom—but the pre-war threat from Italy and Czechoslovakia.

It is reliably reported that in Sweden as in other countries, there is an increasing tendency on the part of the average man and woman to buy ready-made clothes from shops serviced by garment makers, instead of going to bespoke tailors. It is estimated that there is less than a quarter of the number of bespoke tailors in Sweden compared with the years between the two wars, and this tendency is viewed in some quarters with a certain amount of dissatisfaction.

It was unanimously agreed by the mission that despite the use by Swedish wool textile mills of the most modern machinery and methods of management, the final products are in practically all cases inferior to those of Great Britain. This opinion must be qualified by the statement that for some time Sweden has had to adulterate her cloths by the admixture of synthetic fibres to the extent of some 40 per cent, with the natural result that the materials are papery in handle and have inferior draping qualities. Moreover, even on the old 18 kroner rate of exchange and not the more recent 14 kroner rate, most of the cloths which were costed were found to be substantially higher in cost compared with similar types produced in Great Britain.

2. MANAGEMENT AND ORGANISATION

THE management and organisation of the wool textile industry in the three mills visited was extremely fine in conception, being modelled on the latest scientific principles used in America. Starting with the managing director, the supreme governing authority, it was co-ordinated through the technical director and the various works managers, superintendents and departmental managers, right down to the department where, in addition to those named above, there was what was termed the Master of the Department, who was responsible for actual production. In addition, there was the usual foreman and leading hand on the job itself. The work was governed from a central planning department and written instructions issued from there downward. In one of the mills visited very satisfactory use was made of a central clearing telephone organisation, referred to later, the purpose of which was to save time and co-ordinate the general running of the department.

(*a*) QUALITY CONTROL

QUALITY control was carried out to very fine limits, no material being passed from one department to the other without thorough examination by responsible people, so that the subsequent operation gave the highest efficiency.

One aspect of quality control in which interest was displayed concerned the

examination by hand of all yarn. Yarn in skeps is conveyed by means of a travelling belt to elevated platforms on which the girl responsible for the inspection is sitting. On her pressing a pedal with her foot, the skep of yarn is made to pour over a table, so that she is able to reject defective bobbins, allowing the rest to drop into another skep which is carried away by another system of conveyor belts. Although the number of rejects was noticed to be very small, and although the management of the mill in question confirmed the fact that defective bobbins represented only a very small percentage of the sound material, the system was said to be well worth while.

Swedish manufacturers appear to be not unmindful of the possibilities of electronics as a means of controlling quality of their products, but there appear to be no practical applications of this system in the mill, and for the moment control is exercised by means of repeated testing in the laboratory and by such visual examination of yarn as that described above.

So far as regularity of yarn is concerned, the principle followed seems to be to try to spin in such a way that the count on the middle of the spool is the correct one, and that any inaccuracies in count are either at the beginning or the end of the spool. Such irregularities in count as do occur are attributed to the condenser and it is admitted that the main cause of this defect lies in the leather tapes which of course, give varying degrees of tension, this leading to irregular yarn. It is hoped to overcome this type of trouble by the employment of steel instead of leather tapes.

(*b*) CONTROL OF MACHINES BY THE CENTRALOGRAPH

IN all the three mills visited production is recorded and then analysed by means of a device known as the centralograph. This machine, originally invented by a Hungarian firm and later patented in an improved form by the Swedish electrical firm of Ericson, takes the form of a straight line graph machine, usually housed at some central point, and it records electrically the stoppage and the reason for the stoppage of every machine in the mill, whether card, mule or loom. In its original state the centralograph merely recorded the time and duration of the stoppage, and some of these machines are still extant but the improved models show one of nine reasons why the machine has been stopped. This is recorded by the operative who, because of his wish to exculpate himself for the stoppage of the machine, dials a number on a dial very similar to that of a telephone, each of the numbers dialled representing a certain reason for a stoppage. Thus, the code used in the spinning is as follows :

1. Waiting for the foreman
2. Doffing
3. Waiting for bobbins from the carding
4. Stoppage due to threads down
5. Changing a new spinning lot
6. Repairing
7. Cleaning the spinning machine between blends
8. Oiling
9. Repairing the spinning tapes

We were given an opportunity of studying an analysis of stoppages for the

above reasons, and the following are representative percentages for stoppages over the past year :

1.	Waiting for foreman	.1 to .2	per cent
2.	Doffing	4.5	»
3.	Waiting for bobbins from the carding	Nil	
4.	Stoppage due to threads down	.2	»
5.	Changing a new spinning lot	.9	»
6.	Repairing	.5	»
7.	Cleaning the spinning machine between blends	.9	»
8.	Oiling	.3	»
9.	Repairing spinning tapes	.5	»

In addition stoppages are incurred owing to breakages of too many ends and this is represented by an additional 8 per cent. For the representative period analysed, the efficiency of the mule in question is, therefore, 84 per cent. Taking the spinning as a whole, the percentage efficiency works out at between 80 and 85 per cent.

Although we have no statistical records in Great Britain to show mule efficiency it would be surprising if our efficiency approached this within measureable distance.

(*c*) CENTRAL CONTROL

A refinement of the centralograph at present being tried out in one of the mills consists in the use of a panel of small electrical indicating lamps which show whether or no any particular stoppage on a machine is one that can be easily rectified by the provision of immediate help. In the mill which has incorporated this device, the centralographs are supervised by a telephone operator, who, on noticing that the electrical system indicates that the stoppage is one that can be remedied, takes appropriate action by telephone, so that if, for example, the stoppage is one that has been occasioned by a mechanical breakdown the foreman concerned can be immediately notified. Similarly, if, for instance, a loom is running out it is a simple matter for the operative concerned to indicate this circumstance on the centralograph and for the central operator to take prompt action over the 'phone. This device, which is in its experimental stage, but which promises well, is of particular use in large sheds and spinning rooms where the foreman cannot always be readily found.

(*d*) CARDING CONTROL

THE carding in one of the mills visited processes some 800 kilos. of material per shift and the machines are run three shifts a day. Three sets of cards are housed in one large room, and when all three sets are running two men are employed at the front of the cards because of their high slubbing delivery speed of 25 yards per minute. In addition, one man goes round the cards supervising. The analysed figures for carding production as shown by this centralograph over a representative period are given below :

1.	Waiting for cleaners	1.5 per cent
2.	Actual fettling	5.0 per cent to 6.0 per cent
3.	Waiting for the next lot of material	.5 per cent
4.	Waiting for empty condenser bobbins	Nil
5.	Stopping for cards made up	1.0 »
6.	Stoppage for repairing	.6 »
7.	Saturday morning cleaning	2.3 »
8.	Oiling	1.3 »
9.	Repairing belts	.3 »
10.	Lot changing	.7 »

It is interesting to note that the efficiency of the cards has been improved gradually during recent years, the relative figures being:

	Stopping Time	*Resultant Efficiency*
1943	22.00 per cent	78.00 per cent
1944	17.90 „	82.10 „
1945	14.75 „	85.25 „
1946 to date ..	13.00 „ to 15.00 per cent	85.00 „ to 87.00 per cent

The reason for this improvement in efficiency is said to lie in the fact that new machines are continually being installed and new ideas are being tried from week to week.

It may be noted that the speed of each card is measured by an instrument on the bobbins, and that a record is then kept of the speed. The management decide, in the first place, at what speed cards shall deliver and this is indicated on the speed recorder, but since the operatives in carding work are on a piece rate and not on a time rate, there is a natural tendency for them to increase the speed of the card above that which has been fixed by the management. This practice is considered to be a sound one, because the product of the mules is constantly being analysed for strength and regularity in the testing laboratory, and if the production of the cards were being pushed too far by ambitious workpeople this fact would be brought out in the laboratory.

The cards to-day are being run at 16 to 17 metres a minute and comparable figures for previous years are:

1943	17.2 metres per minute
1944	19.2 „ „ „
1945	18.3 „ „ „

When account is made of the stoppages for the various reasons enumerated above, this production is reduced to:

1943	13.4 metres per minute
1944	15.8 „ „ „
1945	15.6 „ „ „

This reduction in efficiency has been put down to the fact that the material now being used in the cards needs more carding, and, therefore, speeds have had to be cut down somewhat.

In one of the mills visited, the centralographs are housed in the porter's lodge, so that when the foremen enter the mill premises they can first of all inspect the production efficiency in previous shifts of different machines under their charge. In this way they can see whether a machine has been giving any production trouble and can quickly take the appropriate action. On one card neon tubes had been installed at the delivery ends in order to facilitate the work of the operatives.

(*e*) TESTING

THE quality of production is continuously analysed in elaborate testing laboratories, and all the three firms visited seem prepared to spend a great deal of money in an endeavour to discover cause and effect. One of the most interesting pieces of apparatus is a continuous yarn testing machine which has been employed for the past 10 to 15 years with conspicuous success. The procedure consists of passing yarn at fairly high speed between two cylinders, the second of which runs at some five or more per cent greater speed than the previous one. Between the two cylinders tensioning devices are incorporated. Because of the greater speed of the second roller a pre-determined amount of tension may be applied to the yarn with a view to discovering its breaking point. By means of the tensioning devices between the two cylinders the actual elasticity of the yarn is recorded graphically so that an analysis may later be made of the

frequency and the severity of the irregularity. At the same time it is possible to discover whether the yarn recovers from the tension which is imposed, because it is subsequently automatically wound on to a reel, where its length can be accurately measured and compared with its original length. By the continuous use of this machine, it is claimed that a constant check is provided on whether or no production is being speeded up too much.

All routine testing in laboratories is done by girls and only the executive work is done by men.

(*f*) BUNDESMAN TESTER

THIS machine consists in stretching three samples of cloth some 4 in. in diameter over circular cups housed in the bottom of a large cylinder where they are continuously sprayed with drops of water from a rose. The material is subsequently removed and the amount of moisture absorbed measured. The weight of water which has passed through the cloth into the cups is also weighed and from these two calculations it is possible to estimate accurately the water proofing properties of the cloth concerned.

(*g*) AVOIDANCE OF FAULTS

IN order to prevent the occurrence of faults, the management of some of the mills have devised a table showing the way in which faults in different processes arise. The amount of waste involved through the faults concerned is stated and the depreciation in value of the material is mentioned, and in this way it has been found that the incidence of faults in processing can be minimised. In the mending room girls are provided with a card system showing different types of faults, how they arise and how to deal with them.

(*h*) WEAVING EFFICIENCY

THE Swedish mills have full production statistics regarding the number of picks and the weight per man-hour and have also a system of working on the number of picks per loom-hour, which is recorded as a measure of the efficiency of the loom.

In one of the mills visited, the average overall efficiency of the weaving shed was said to be 70 per cent. For efficiency purposes, looms have been divided into six groups, according to the type of work on which they are engaged, and the skill of the minder. Thus, while the average efficiency for the shed is estimated to be in the region of 70 per cent, the fully automatic looms run at from 80 to 85 per cent, while the non-automatic types minded by beginners run at no more than some 40 to 50 per cent efficiency.

It was admitted that only a few weavers are fully competent to manage four non-automatic looms, and it was complained that since there is not the same measure of permanence of workers employed in Swedish wool textile mills, compared with the United Kingdom, employers are at a disadvantage in that they have a high proportion of beginners or only partly trained workpeople.

As an indication of the greater production per man-hour in Sweden compared with Great Britain, the following table, showing the numbers of people minding different numbers of looms is interesting.

NUMBER OF LOOMS	LOOMS PER WEAVER
14	1
(This category is usually confined to learners or older people who are regarded more or less as pensioners).	
74	2
48	3
36	6

MANAGEMENT AND ORGANISATION

(*i*) BREAKDOWN OF COST

THE following percentages show the breakdown of cost between raw material, wages, overhead charges, research and management.

	per cent	per cent	per cent
(A) *Cost of Raw Materials*			54
(B) *Cost to Manufacture :*			
(i) Labour (carding, spinning and weaving)		17	
(ii) *Manufacturing Expenses :*			
(*a*) Depreciation and fire insurance, machinery, equipment and mill building	6		
(*b*) Repairs—machinery, equipment and mill building	6		
(*c*) Factory supplies, fuel and power	6		
(*d*) Salaries of supervision and overseers	3		
(*e*) Cost of sundries	1		
	22	—39—	
(C) *Cost of Research :* Cost of mill laboratory and expenditures for research purposes			0.5
(D) *Cost of Selling :* For charges for such items as : advertising, demonstrations, sales commissions, sales salaries, repairs to sales equipment, telephone, postage, depreciation on sales equipment, etc., etc., assignable to selling			3.5
(E) *Cost of Administration :* Includes charges for such items as : office salaries, accounting, legal fees, stationery, repairs to office equipment, depreciation on office equipment, insurance, trade associations' dues, etc., assignable to administration			3.0
			100.0

The following table shows the production of yarns and woven piece goods per man hour from 1920 to 1939 :

YEAR	YARNS WOOLLEN AND WORSTED KG/MAN-HOUR	WOVEN GOODS ALL KINDS KG/MAN-HOUR
1920	1.182	0.657
1921	1.115	0.573
1922	1.198	0.486
1923	1.235	0.629
1924	1.282	0.629
1925	1.253	0.632
1926	1.283	0.616
1927	1.246	0.626
1928	1.288	0.622
1929	1.267	0.629
1930	1.461	0.643
1931	1.387	0.696
1932	1.298	0.685
1933	1.382	0.677
1934	1.497	0.706
1935	1.508	0.734
1936	1.598	0.758
1937	1.698	0.790
1938	1.601	0.748
1939	1.595	0.779

LABOUR

(*a*) TRADE UNIONS

ALL the Swedish trade unions appear to be very well organised, 90 per cent of the working population being members of some union. Workpeople who hold the position of foremen and managers, however, are not members of trade

unions, but have their own association, which is a non-political body with no political background.

There are six and a half million people in Sweden and of this number one million one hundred thousand are in trade unions. The latter number includes practically all the industrial workers in the shipyards, in mining, in textiles and other industries, and they all come under one central organisation in the same way that the trade unions in Great Britain come under the Trade Union Congress.

It appears that there is a very good sense of discipline among Trade Unions, and that official or unofficial strikes are very rare indeed. This is explained by the fact that not only the employers' organisations, but also the trade unions are very wealthy, and if they did come to loggerheads and a strike were to ensue, it might well be costly and of very long duration, owing to the financial resources of the opposing organisations. In cases of dispute between the employers and the employees, discussions are in the first place inaugurated, and if no settlement can be arrived at and the matter is one of jurisprudence, it is taken to the Courts and a decision is arrived at through arbitration. This, however, is a process which has not been used for the past five years.

Once a year, employers meet the Trade Unions and arrange an agreement of one year's duration, this agreement being fixed under an independent chairman who is neither a Trade Unionist nor an employer, but usually a councillor or a man of similar standing.

The Trade Union movement is split up into branch organisations and local organisations, and an attempt is made to see that men of the same trade are in the same organisation.

Ninety per cent of the people engaged in the wool textile industry are members of the Trade Union, there being only one textile Trade Union. Apparently, the only exceptions are some women who have religious objections to joining such a movement together with other improvident girls who prefer to spend their money elsewhere. Employers do not try to stop their workpeople from joining the Trade Union organisation but, by the same token, they do not actively encourage them to do so.

The relations between the Trade Unions and the employers are said to be very good indeed, and this appears to be due to the fact that the roles of the two bodies are definitely established. The Trade Unions, for instance, are not consulted about the number of machines which should be minded by one man. This is a matter which is essentially the province of the employers, who, when investigating such questions rely on their time and motion study experts in conjunction with the Trade Union representatives. As a result of such an investigation, workers are told that they are expected to mind so many machines, and there is no opposition from the Trade Unions. The latter are, however, consulted in all questions of wages, different rates being fixed by mutual agreement once a year.

Trade Union officials are said to be completely free to visit different mills provided there is no suspicion that they will mis-use the information derived from their visit in the interests of other firms. The various wool textile firms in Sweden, although working in competition with one another in what is virtually a closed market seem to exist nevertheless on very friendly terms, and there seems to be no difficulty in arranging for interchange of young men between one firm and another.

(*b*) RATES OF PAY

TIME rates are fixed at the annual general meeting between the Trade Unions and the employers. No regard is paid to the different skills, all operatives, whatever their job, receiving the same rate. Each, however, receives a rate of pay according to the town in which he lives. Thus, if a woollen spinner were working on a time rate basis, he would receive the same wage as would a lift man. There is some exception to this practice, however, in that if an employer considers that a particular workman is a good one, he can pay him more than is laid down in the agreement. On the other hand, the Trade Unions cannot come to the employer and compel the latter to pay a particular workman more, because the rates of pay are laid down in the annual agreement between the Trade Union and the employers. It should be added, however, that these exceptions seldom take place, because they would lead to employers being bombarded with requests for higher rates of pay when they were not justified. Another reason is that if they were widely practised, it might involve competition between one firm and another for workpeople.

Piece rates are arranged to yield 15 per cent more than time rates, but in actual practice the addition varies between 15 and 40 per cent and sometimes more than 40 per cent. There are different grades of piece work, and these are adjusted in accordance with the skill of the worker in the group. The most skilled type of worker is, of course, the weaver and her or his skill is graded according to whether he or she looks after one, two, three, four, five or six looms. If it is found, after an investigation has been made by a time and motion study engineer, that a weaver should be able to weave so many thousand picks per hour, the proper rate for this number of picks is then decided upon, and the employers do not then mind how much more money the weaver may earn over the standard. It appears that the practice of minding one loom per weaver is confined to older people who are regarded as pensioners of the firm. Men mind two, three and in rare cases four non-automatic looms and ancillary work connected with weaving, such as the carrying of weft, is undertaken by persons other than weavers.

Rates of Pay in Spinning

The rate of pay in spinning is based on the time run by the machines, and this is recorded by the centralograph which records the stoppages and the reason for the stoppages on different mules. To this is added an extra sum of money to pay the operative for the changing of bobbins and roving. There are thus only two rates of pay in the spinning, one being based on the number of minutes of machine time and the other on the number of doffs that have been made. Both of these factors are, of course, recorded on the centralograph, and it is, therefore, a simple matter to calculate the wages that should be paid to different spinning operatives.

In one of the mills, it was stated that some 73 per cent of the work is on a piece rate basis. Some operations are obviously not capable of being based on a piece rate and have to be paid for on a time rate basis, in which case the operatives are paid an extra percentage in compensation, but the feeling of employers seems to be that piece rates are preferable in all cases where they are practicable. Apparently, wool textiles have made good progress in the establishment of piece rate working, because whereas only 60 per cent of the working population in Sweden is engaged on piece work, 73 per cent of the workpeople in wool textiles are engaged on piece rates.

Since foremen do not belong to the Trade Unions, but to a non-political association of their own, their wages are decided upon separately from those of the Trade Union, and are determined by the ability of the man concerned, this being assessed by considering the number of schools he has attended, by his ability to act as a leader and also, of course, by his technical skill. Here, it may be noted that the schools that may be attended by foremen and others are carefully graded, and that it is not unusual for foremen to go to schools devoted to psychological studies. If he proves himself to be worthy of the position, he eventually becomes a mill supervisor.

As an indication of the division of work between automatic and non-automatic looms it is interesting to note that at one of the mills visited 81 per cent of the weaving output during the week when the mission visited the mill in question was accounted for by weavers minding 6 automatic looms or 3 non-automatic looms. This firm employs one weaver per 4 non-automatic looms only when the weaver is highly skilled and when suitable arrangements can be made for young persons to help in the ancillary work associated with weaving.

One interesting fact which was brought out in the course of a conference with Mr. O. Thurdin, Managing Director of the Swedish Textile Employers' Association, was that even though the picks per hour put in by a weaver in one factory were more than in another, his actual pay may be the same. Thus, if an employer has out-of-date looms which are not capable of running at the same number of picks per minute, he has to pay his weavers more for each thousand picks inserted in the cloth. The Swedish wool textile manufacturer is in this way given a powerful incentive for putting in most modern machinery, so that he may get greater production for the same wage. Another very important incentive is the fact that machinery can be written off within a year if necessary.

(c) TIME AND MOTION STUDIES

THE textile Trade Union is said to be enamoured of the principle of job rating, although its contemporaries in the engineering industry are opposed to the idea.

Time and motion studies are agreed to by the union because the latter's representatives are allowed to co-operate with the expert who investigates manipulative problems. The Trade Union leaders are well versed in management problems and rarely quarrel with rational propositions. If, for instance, there are 50 weavers in a mill, the employers go to the Trade Union and say: "We propose to take weavers A, B and C as being representative workers of the mill, and we propose to time and motion study them with a view to discovering how many looms they can mind."

It should perhaps be noted that not all mills have time and motion study experts of their own; some have to rely on consultants, and it sometimes happens that if a mill has trouble with a difficult manager, the Trade Union will ask for a time and motion study consultant to be called in for investigation purposes.

Swedish manufacturers apparently practise motion studies as distinct from time studies. The first consideration in time studies is not the rate of wages, but is to ensure that the lighting is satisfactory, that the transport is convenient and that no unnecessary labour is involved.

If, after investigations of this kind, it is found that the conditions are satisfactory, and if as a result of the investigation of time and motion study experts, it is discovered that a man can comfortably look after say, 12 looms, the

employers simply say that 12 looms must be minded. As the number of looms is increased, of course, increasing provision is made for attending to the weavers' requirements so far as the supply of yarn and other material is concerned, but once it has been established by joint agreement in the factory that a certain number of looms is a reasonable share for weavers, the Trade Union is not consulted except on a point of wage.

It is advisable to state that our observations on matters to which we have already referred are based upon information we received from three employers and the Managing Director of the Swedish Textile Employers' Association. We did, however, try to arrange a conference with the chief official of the Textile Union but unfortunately this was not possible owing to his illness.

(*u*) FACTORY WELFARE

A GREAT deal of time and forethought has been spent in catering for the comfort and convenience of workpeople. Thus, in all of the three mills visited a very up-to-date dressing room for workpeople had been built. The usual practice of workpeople is to come to the mill well-dressed and then to change into their working clothes, hanging their town clothes on hangers which are specially provided for each man and woman. In the dressing rooms are showers, wash bowls and paper towels. Incidentally, although clothes and other valuables are not under lock and key in the dressing rooms, thefts are conspicuous by their absence.

In one mill the lunch time requirements of the workpeople are catered for by the provision of a special room for the storage at a constant temperature of milk and other liquid refreshments. The canteens are comparable in their general comfort and convenience with a good class of hotel in Great Britain. They are clean, well furnished and bright and cheerful, and the tempera pictures which in many cases are painted on the walls of the canteen testify to the artistic appreciation of the workpeople. The quality of the food served in at least one of the mills is vouched for by the fact that at lunch times the directors of the firm, as well as the workpeople, eat in the canteen. Certainly, it may be said that when we partook of lunch at one of the firms the food then provided, which we were told was of a representative quality, was much better than could be obtained in any hotel in England.

It was stated that payment for accidents was borne by the State, but that employers had to pay insurances. One employer stated that at his firm the number of accidents reported to the Insurance Association amount to 0.06 accidents per employed person each year. This includes accidents on the way to and from work. It is a law of Sweden that all workers shall receive 12 days holiday per year, and that during this holiday period they receive the average of their weekly earnings.

Child Welfare

In the town of Norrkoping there are two " barnkrubbors " or creches, which are Government subsidised and run by the different firms for looking after the children of workpeople in their employ. It is understood that no Government assistance is provided but that the firms may, if they wish, claim a subsidy from the Government. These creches are run on Froebel lines, and it was very heartening to see the way in which young children between the ages of one and five are trained in a healthy way of life, in cleanliness, orderliness and artistic appreciation. In the creche visited there are facilities for some 30 day children, for which the payment is 75 ore (1s.) per day and 25 weekly visitors for which

the payment is 125 ore (1s. 10d.) per day. The firms concerned expressed themselves as being very satisfied with the work which is being done by these creches, saying that mothers found that the health of their children improved after a few months' stay in one of the creches, due to their having much better attention than they would have if left at home with improper care. We were informed that there are other creches in other Swedish towns and that the one visited was by no means exceptional.

(*e*) HOUSING CONDITIONS

DURING their stay in Gothenburg, the mission was given an opportunity, which they readily accepted, of inspecting the workers' flats in the neighbouring town of Boras. Several flats were inspected, some of them built within the last few years and others 50 years old, and the unanimous opinion of all members of the mission after going round these flats was that to the best of our knowledge, nothing comparable for the working class community could be found in Great Britain. Most of the flats are the property of a company, two-thirds of the capital of which is owned by the town and one-third by the mills. They are run, therefore, not on profit-making lines, but merely with a view to giving the different workpeople in that district the maximum amount of comfort compatible with a reasonable cost. Some idea of the cost may be obtained from the fact that a two-roomed flat costs 97 kroner (£7) per month, and a three-roomed flat costs 120 kroner (£8 10s.) per month. It is misleading to convert this rent into pounds at either the new or the old rate of exchange, but some idea of the cost to workpeople may be gained from the fact that the average time rate earnings of a worker in a wool textile mill is estimated to be in the region of 73 kroner per week.

The blocks of flats are communal, self-contained units. The heating and hot water supply for seven blocks of flats is obtained from an oil-fed British boiler, which is tended by one of the caretakers. In each block of flats provision is made in the basement for communal washing, and for bathrooms comprising ordinary baths, showers and Turkish baths, but some of the flats have their own private bathrooms. There is also a large festive room, beautifully decorated with tempera murals, which may be used by a group of families for celebrating birthdays and the like, and which is large enough to accommodate comfortably a few dozen people. Other communal facilities comprise joiners' rooms for youths who traditionally are interested in woodwork generally and in yacht building in particular; sewing rooms for women where they can either sew or weave tapestries and carpets; and a Sunday school for the younger people of the settlement. In addition, there are recreational facilities for the children outside the flats—neat and tidy lawns, paddling ponds, swings and the like.

The actual interiors of the flats are perhaps diminutive but the different rooms are well arranged and in practically every case are tastefully decorated not only with furniture of very good quality, but also with original paintings. Indeed, one of our most striking impressions is the high standard of artistic appreciation of the people in Sweden as judged from their homes.

Some of the flats are owned outright by the mills, and these seem to be comparable so far as their general convenience and rents are concerned, with those which are jointly owned by the town and the mills. There is this difference, however, that in the case of flats which are owned by the mills, the rent is lowered progressively according to how many members of the family work in the mill which owns the flat. For instance, a three-roomed flat owned by

the mill is rented at 70 kroner per month, but there is a reduction of 10 kroner per month for each of the occupants who work in the mill which owns the property. It is interesting to note that according to one estimate these flats represent a cost to the mill concerned of some three to four per cent of its turnover, but since Sweden is not preoccupied with any export endeavour, this extra charge seems to be a matter of comparatively small significance. It is also worth mention that if a tenant relinquishes his employment in the mill in whose house he is living, he need not necessarily give up his tenancy, but he will be called upon to pay a higher rate of rent.

Although the difficulty is not so acute, Sweden appears to be passing through similar difficulties to those experienced by Great Britain so far as the supply of labour is concerned. This is accounted for by the fact that the standard of living has generally increased in Sweden during the war owing to the high wages paid in shipbuilding and other industries. As a consequence women seem now less disposed to supplement the earnings of their husbands by working in textile factories.

A successful, albeit limited, attempt has been made to mitigate these difficulties by making use of refugees from Esthonia. These people, who in their native land were in some cases bankers and in others farmers, are housed by the mills in flats of a more primitive kind built on the lines of British militia camps. They are said to be good workers and employers would be ready to employ greater numbers of them if this were possible. Apparently they can be trained for most of the work in a woollen mill in a matter of some three months.

One impression left in the minds of the party which perhaps is on the debit side of Swedish management is that the breakdown of management to such fine limits may take away the incentive from labour. By this we mean that it does not seem necessary for the average workman in the mill to use his brains and initiative to the same extent as in England, and the danger is that the operative is being reduced to a mere pusher of buttons and puller of levers, destroying that fine basis of craftsmanship on which the success of the British textile industry has been founded.

4. BUILDINGS AND MACHINERY

(*a*) LOCATION

HYDRO-ELECTRIC power and the absence of open fires keep the atmosphere very clean, so that even industrial towns are comparable with many residential and seaport towns in England. Many of the towns are situated on beautiful waterways or near to lakes and a great many people of modest means own a small motor boat or yacht, and very often a summer cottage on a lake. The ambition of each young worker is to own his own yacht or boat, and it is common to find that several of them will club together for this purpose. Inside and outside the mills there is an abundance of colour, and it is no small wonder that the workpeople in Sweden have an appreciation of the arts.

(*b*) TYPE OF STRUCTURE

THERE appears to be little uniformity so far as the type of building used by Swedish woollen mills is concerned. One of them, perhaps the most modern, is built on the single-storied principle, and at either end of the long shed is a long corridor which is used for communicating purposes. This system gives a feeling of spaciousness and no doubt the idea is capable of practical application

in a country such as Sweden where there is a great deal of land and comparatively few people. In towns such as Norrkoping, however, where there is more congestion, old multi-storied mills have been thoroughly modernised and adapted for the manufacture of wool textiles. In all of the mills admirable arrangements have been made to ensure a good flow of production.

(*c*) HEATING AND POWER

OWING to the shortage of coal and coke in Sweden recourse has had to be had to wood-fueling, which gives an inferior thermal efficiency and also is very much more costly than either coke or coal. The wood is derived from resinous roots and is chopped up into small pieces about the size of a man's thumb nail, afterwards being blown to the hoppers of the boilers. It is significant, however, that in the near future it is hoped to replace wood fueling by oil.

Because of the high price of wood compared with coal (the ratio is 130 kroner to 30 kroner) and also because of the low thermal efficiency of wood compared with coal, the cost of power and heating in Swedish mills is now comparatively high, but it nevertheless represents no more than three per cent of total costs, and this, judged by British standards is low. The cost of power so derived comes to 3.8 ore per k.w. hour.

Another device of interest was the water purifying plant. The river water in Kristianstad is reported to be very soft and suitable for textile purposes, but it contains too much organic matter and has a dark brown colour. To overcome these defects, the water is pumped to the stirring basin where aluminium sulphate is added. From there, the water flows to a large precipitation basin where a precipitate of aluminium hydroxide forms and settles. This precipitation contains the objectionable organic matter. From this basin, the water proceeds on to two sand filters and after passing through these the water is quite limpid and colourless and ready for pumping to the mill.

(*d*) MACHINERY

ONE of the most striking features of the mills visited is the vast amount of new machinery which is employed. Most of the machines are Swiss, German or Swedish, and they are the very latest design. This has been made possible by the fact that the Swedish Government, which has been in power for the past 14 years, allows any firm to write off its machinery within one to three years according to the desire of the firm concerned. It is emphasised that only in this way can Sweden produce economically because in future she will have to compete with countries in which the standard of living is much lower than at home. Thus, while the incidence of taxation may be very heavy—it is estimated at 90 per cent on profits over a certain level—industry is given a very big advantage indeed by the allowance

(*e*) RAW MATERIAL SORTING, HANDLING AND BLENDING

THE handling of raw material is based on the pneumatic tube principle, and is most efficient. All material is stored in square bales, which are made in an automatic baler connected to the various machines. Rag machines, waste machines, garnetting machines are all connected with this hydraulic baler and nothing is handled by the workman. Scouring is done automatically, and after the material has been fed into the scouring bowls, it is automatically dried and again blown into the automatic baling machine. This method very largely solves the storage problem. The subsequent blending of the various raw

materials, after the preparing process, is done by pneumatic tube, and two men only are needed to do the whole of the blending from the bale to the finished blend, which is blown behind the carding machine in the carding room. The whole system of transport by air or pneumatic tube is estimated to cut out about 80 per cent of the labour required by ordinary methods.

All wastes from the department are blown by a reflex process back to the raw material store, where they are sorted and baled and used again according to requirements. The same system is applied to wool carbonising and dyeing. The mixed blend is now in the carding department and is precisely where it is needed. The deployment of labour in this department is interesting. Thus, one man is responsible for filling the hoppers of 17 sets of continental cards. His job is solely the filling of the hoppers from the bins into which the willeyed blend has been blown.

(*f*) CARDING

IN the carding department of one of the mills there are 9 carding sets together with one shoddy carding set, and the production in two shifts averages 12,000 kilos for 10's metric count and 20,000 kilos for 5's metric count. Each set is driven by three commutator motors and the motors are housed under the floor. For every three sets of carding one woman is employed for bobbin changing and one woman is used for feeding 9 sets of carding. For the 9 sets of carding, three fettlers are employed.

The carding machines are of the full continental type running at very high speeds and making very large packages, the size of the condenser bobbins being 13 in. diameter, which is about 50 per cent larger than the English system. The machines we saw turn off 160 threads on four bobbins per set, running at 17 metres per minute. This is an extremely high speed, but we did notice that the quality compared with English standard is low, due to neppiness of the slubbing. The spacing of the machinery is extremely generous, 10 feet being allowed between the cards. The condenser bobbins are transported by specially made racks to the mule, and here again the deployment of labour is very different from the English system.

(*g*) SPINNING

TO cope with the carding output mentioned, 16 self-acting mules are employed five of them being Hartmann differentials with a total spindleage of 6,327. One woman spinner is employed for each self-acting mule and a woman helper is employed for every two self-acting mules.

The worsted spinning section of the same mill comprises one intersecting gill box for use prior to top-dyeing, one melange intersecting gill box, two intersecting gill boxes, two intersecting frotteurs and four French roving frames. Each of the foregoing machines is minded by one man or one woman. Five ring spinning frames cater for the production of the previous machines, the total number of spindles being 1,960 Production per two-shift week amounts to 3,000 kilos for 30's metric count. One woman spinner is employed for about 200 spindles and she is helped by one woman spinner for every thousand spindles. All the machines in the worsted spinning department have individual electric drives.

In another mill 880 woollen mule spindles are looked after by two operatives. Large condenser bobbins are used, and two full doffings are obtained per set of condenser bobbins. S.K.F. Norma ball-bearing spindles are employed on

the mule and they run at 3,500 revolutions per minute. Three sets of cards supply eight mules with 440 spindles.

Twisting

In the same mill twelve twisting frames are employed, these including two Rieter frames for doubled yarn, and the number of spindles amounts to 2,324, running at a speed of up to 8,000 R.P.M. and giving a production per week of 10,000 kilos with two-shift working. On the two yarn doubling machines employed, one woman twister minds about 120 spindles.

(*h*) WINDING AND YARN PREPARATION

IN all the mills visited a tremendous amount of effort has been put into the preparing of yarn before weaving. Examination manually and in the laboratory is carried out thoroughly. Warp winding on to large packages is a regular feature, and when used with the battery warp creel, gives a very high speed of warping—1,200 metres per minute on worsteds and 740 metres per minute on woollens were mentioned as possible speeds, but the average for woollens seemed to be 400 metres per minute. This is extraordinarily high. One person is employed to look after this machine, another two being needed for the creeling. The weft yarns were wound by the Schweiter pirn winding machine on to 10 in. bobbins. This is one of the main reasons why weavers can mind four non-automatic looms.

Interest was shown in a new pirn winding machine made by Schärer of Zürich. It is fully automatic and builds not on to a tube, but on to a spindle, so that the weight of the yarn in the pirn is increased. The feed is from four bobbins behind the machine, which are topped and tailed so that stoppages due to the running out of supply are reduced to a minimum.

The increase in strength derived from cellulosic sizing of warps was said to be some 10 per cent. After sizing the warp goes into a drying machine which is so constructed that throughout all its passage through the apparatus the yarn does not come into contact with any part of the machine.

All yarns that are to be stored for any length of time are given a moth proofing process, which consists simply of the immersion of the cop in a solution of mitin. This is only a superficial process affecting the surface of the cop and does not penetrate into the body of the material. Subsequently, all the cloths are moth proofed with the same product.

(*i*) WEAVING

OF the 172 looms employed in one firm, 36 are Northrop automatics, one Rüti, one Saurer and 134 Schonherr non-automatics. It may be interesting to note that in the near future, the firm expects to put down 24 new Northrop four-colour automatics, together with 16 new Saurer four-colour automatics. It was noticed that one weaver looks after six automatic looms weaving woollens and it was reported that when the new automatics are installed, one weaver will mind eight looms. From the looms mentioned, the total production per week amounts to between 40 and 45 million picks, and this gives in the region of 9,000 picks per weaver per hour. A well managed British weaving shed weaving woollens and running at 75 to 80 per cent efficiency produces, on the average, 4,000 picks per weaver per hour, one loom per weaver. We had an opportunity of seeing one of the first power looms constructed in Sweden. This is a modification of the Schonherr centre shedding automatic power loom, and considerable interest was displayed in its different mechanisms.

The possibilities of this loom are at present being closely investigated, and it was reported that refinements will be introduced as time goes on.

(*j*) DYEING AND FINISHING

DYEHOUSES in particular have been extensively modernised both so far as their machinery and their lay-out are concerned. Extensive use is made of automatic humidification and temperature control, both of which not only facilitate processing, but also contribute to the comfort of the operatives. Most of the old-fashioned dyeing machines have been discarded and have been replaced by a universal type of vat made from stainless steel in which material can be dyed in the form of warps, yarn on cheese, slubbing and raw wool. An elaborate system of overhead carriage-ways, operated electrically, reduces to a minimum the actual amount of hand labour involved in dyeing. It is also noteworthy that cellulosic filters for air cleaning purposes have been used with very satisfactory results. We were given to understand that all dyeing and finishing machinery is now made in Sweden.

In one of the mills the dyehouse is situated next door to the boiler house, in order to conserve heat in the transference of steam for heating purposes. Indirect heat appears to be employed in most of the machines in the dyehouse and the greater part of the water used for starting up in dyeing and scouring is taken from large storage tanks which are housed in a separate part of the building, and which have a storage capacity of 25 tons of water, this being kept at a constant average temperature of 90° C.

All the mills have the latest finishing machines, multiple cutters and hydraulic pressers, and all the finishing departments visited were highly efficient, some of them having a special machine for testing shrinkage before pieces were passed forward to the warehouse. Most of the pieces were treated during the various processes for moth-proof, rot-proof, water-proof as a standard finish.

Mending departments are highly mechanised. Special machines are constructed for carrying the pieces over the boards, the board itself being made of plate-glass with the light coming from underneath. A special series of instructions are issued to menders, so that they had only to do a minimum amount of work on each quality consistent with the finished pieces.

5. TRANSPORT

THE Swedish textile industry is very fortunate so far as its transport is concerned. Waterways, rivers and electrified railways provide very good transport facilities. Judged by British standards, transport in Sweden does not appear to present any very serious problems.

6. RAW MATERIALS

THE supply of raw materials has been very difficult for the Swedish textile industry during the last seven years. There has been a very grave shortage of wool, and manufacturers have had to make use of a large amount of synthetic fibres which are made in Sweden. Cloths have, therefore, contained very large admixtures of fibres other than wool—up to 40 per cent has been used—but manufacturers have recently been able to import substantial weights of raw wool.

Wool combing in Sweden is a comparatively small industry and cannot supply all the domestic needs, so manufacturers have had to rely very largely on imports of tops. The market for British tops in Sweden is thus very big.

Use has had to be made of South American wool because of the difficulty of obtaining Dominion wool, and this again has contributed to the inferior quality of the cloths at present being marketed.

Manufacturers have made very good use of their wastes and rags, and their departments for dealing with these materials are run at a very high state of efficiency.

7. MARKETING

VERY little information could be obtained about the precise method of marketing wool goods, but the rough outline of the Swedish system seems to be :

(*a*) Close personal contact with the customers.

(*b*) Development of collections for the new seasons in close collaboration with the prospective buyers.

(*c*) Dissemination of ideas to cloth buyers concerning new lines.

EXPORTS

ONE of the reasons why Sweden can make cloths which, compared with British standards, are not competitive, is that she relies almost entirely on her home trade. Before the war, Sweden devoted some 5 per cent of her output to the Scandinavian group of countries, but we are informed that, with the exception of a few licences to export small quantities to Denmark, there has been no export trade in recent years.

DISTRIBUTION OF OUTPUT

SOME 80 per cent of the production of the Swedish wool textile mills goes direct to garment makers, the remainder being passed to merchants and tailors. Prices of all cloths have been fixed by the Government, but the levels established appear to be very generous, because the prices at which cloths are sold by the mills to garment makers and others are about twice as high as those ruling for similar cloths in Great Britain. The inference that may be drawn from this seems to be that wool cloth manufactured in Sweden may be an economical proposition to the inefficient firm as well as to the well organised one.

When questions were asked about how far manufacturers planned ahead when deciding on their selling campaign, it was brought out that the customary practice is to divide the year into 24 periods. Every piece of cloth that is made is given one of the 24 period numbers, this representing the time when the piece should be ready for delivery from the mill. The system was said to be useful, inasmuch as it ensured that pieces went through the mill in their proper priority rotation.

Some discussions took place with manufacturers concerning how far ahead it was customary to plan. The practice seems to be to make a rough plan for production for the following 12 months, but as time goes on a six-monthly plan is evolved.

There is a system of weekly recording with a view to discovering weekly costs. Once a week production figures are analysed and these are compared with the standard production figures which have been previously calculated, so that an estimate can then be made of the efficiency of each department. This efficiency is then related to wages, the actual production in different departments of the mill being put against the actual wages paid in the same department, so that it is possible to estimate whether or no the actual cost of the article comes within the standard relation of wages paid to output. This gives a plus or a minus against the previously calculated standard cost. When

asked whether he used a unit control cost on weight and length, one employer replied that for every kind of cloth they had a plus or minus cost which represented the average.

Every new type of cloth produced in the wool textile industry in Sweden has to be submitted to a Government organisation with a view to its price being approved, and it was said that this arrangement does serve as a brake on prices, and is not, as in some other countries, honoured in the breach.

8. RESEARCH, DEVELOPMENT, TRAINING AND WELFARE

(*a*) RESEARCH

SYSTEMATIC scientific textile research, as we have come to know it here, is only just beginning in Sweden. They have just completed a not very large, but beautifully equipped, Research Institute as an extension of the Chalmers Technological University in Gothenburg, and it is there that they intend to carry out their more fundamental investigations. The Institute is under the direction of Dr. Nils Gralen, a former pupil of Sweden's leading scientist, Professor Svedberg. Dr. Gralen is also Reader in Textile Chemistry in the Chalmers University, and thus they have avoided from the start what has turned out to be a source of trouble to us, the virtual divorce of our Research Association from research in the University. (In this connection it should be noted that Prof. Svedberg is a member of the Controlling Committee of the new Research Institute.)

The Institute is supported by joint contributions from industry and the Swedish Government. It is not yet fully equipped with regard to either personnel or apparatus, since the Swedes in these respects are at present suffering from similar disabilities to our own. There is little doubt, however, that it will soon become a thriving centre, though it is fair to say—and, of course, the Swedes fully recognise this—that they set out on their new adventure fortified with the great textile research achievements already made in this country.

Neither the Chalmers University nor the new Research Institute is equipped with textile machinery, as it is seen in our own University and Research Association, the idea being to concentrate there more on the theoretical and fundamental side and to award degrees for the high type of technician of which Swedish industry makes so much use. Investigations of a more technological kind are to be carried out at a new Research Institute that is being built as part of the Technical College in Norrkoping, and similar developments are contemplated in connection with the Technical Colleges at Stockholm and elsewhere (note again the close link between educational and industrial research establishments).

We saw only a small amount of original research being carried out in factory laboratories, which were devoted almost exclusively to what would properly be called testing; but the lay-out and equipment of these testing laboratories was a delight to behold.

Altogether, we were greatly impressed by the profound respect in Sweden for the trained mind, and by the promise of sincere co-operation between scientists and industrialists.

(*b*) DEVELOPMENT

IT follows from the previous section that no development has yet been called for of specifically Swedish textile research discoveries, but in another sense,

what we saw in the factories we visited speaks of continuous development, practised with a thoroughness that is hardly to be matched. We mean that there is a constant seeking after new machinery and devices, a sharing of information so obtained, and an overall striving for perfection of co-ordination between all parts of the factory organisation. The ideal of the Swedes seems to be always to make the most systematic use of such resources as are available to them. The contrast between Sweden and our own country is best expressed by saying that we make better things under worse conditions.

(*c*) TRAINING

THE general scheme of running the best Swedish textile mills is to place responsibility more and more in the hands of the management and higher technical staff, who are connected by electrical recording devices to machinery made as automatic as possible and tended in the last resort by the minimum number of operatives. As an example of this sort of thing, it was mentioned that a cotton mill, over the last 20 years or so, had reduced in one department the number of necessary operatives from 26 to 4, though corresponding figures for the wool mills were not available. The training of operatives, nevertheless, is approached in just as systematic a manner. For all of the more important processes carried out in one of the mills there are carefully written and carefully illustrated booklets that the operatives are expected to study, and what is more, provide evidence that they have studied. In this mill there are also film strips and accompanying gramophone records to which the operatives can have access as often as they please. The new hands, of course, also receive instruction at the machines themselves, but there are always the booklets and records to refresh the memory.

For more advanced training the best operatives, as with us, can take courses at the technical colleges and carry out technological investigations at the research institutes that are now in process of incorporation in the technical colleges. For higher training still they may proceed to the Chalmers Technological University and carry out more fundamental research at the new Textile Research Institute that has been made an essential part of it.

(*d*) WELFARE

THE working conditions in the mills we visited are worthy of the highest praise. In the workrooms themselves problems of steam ventilation, dirt, etc., have been successfully overcome by the use of machinery covered in as much as possible, combined with overhead tubes and suction apparatus for drawing away everything obnoxious. With such machines and processes as require the best lighting there are installed special fluorescent tubular lamps that are also adjustable to make the operation as convenient and efficient as possible. Added to this, it seems to be the practice, especially with operations being newly tried out, to have time and motion experts in frequent and sometimes continuous attendance.

All members of the female staff, from the highest to the lowest, take part every day in some six minutes' physical exercise under the direction of an expert specially engaged for the purpose.

The cloakrooms and lavatories are excellent indeed, with arrangements for everyone to take a shower-bath at the end of the day.

We also saw, and in fact, lunched in, a works canteen that was so delightful as to invite comparison with a first-class hotel, and in this canteen management and operatives lunched together with the same excellent food for all.

One of the most charming of the things we saw in Sweden was a nursery where mothers may leave their children for the day or even for the whole week.

There is a widespread movement there to set up such nurseries, and the one we visited was designed to assist all the mothers in a single mill and was jointly supported by the town and the owners of the mill. Words cannot describe the comfort of this baby household, which costs each mother only about 1s. per day or no more than about 10s. all found for a whole week.

CONCLUSION

WE have tried in this report to give a fair idea of what we saw in Sweden. We did obtain many more facts and much more data than is presented in this document, but it is probably far too lengthy already, so we have not included all the information we received. As a Party we think the trip was well worth while, and that it should prove valuable to the Wool Working Party.

APPENDIX II

Mission to Switzerland and France

THE purpose of the mission to Switzerland was to inspect the latest productions in Textile Machinery, especially as the Swiss Textile Machinery Manufacturers have had the opportunity to continue developments during the period of the war.

It was also considered advisable to visit the factories of some woollen and worsted cloth manufacturers in both Switzerland and France.

The Members of the Delegation were the following:

MR. W. H. BANNISTER	Trades' Union Official, Trades' Union Member of the Wool Working Party
MR. B. W. BERRY	Trades' Union Official, Trades' Union Member of the Wool Working Party
MR. F. BOOTH	Machinery Expert
MR. GEORGE DICKSON, O.B.E. ..	Engineering Industry, Independent Member of the Wool Working Party
MR. FRED HAIGH	Cloth Manufacturer, Employer Member of the Wool Working Party
COLONEL H. WALKER	Worsted Spinner
MR. WALTER WARD, J.P. ..	Wool Merchant and Top-Maker, Employer Member of the Wool Working Party
MR. L. E. M. TAYLOR	Board of Trade, Assistant Secretary to the Wool Working Party

The Delegation left London on Saturday, August 17th, and travelled via Paris, arriving in Zürich the following day.

The return journey was made via Paris and Lille, arriving in London on Thursday, August 29th, 1946.

ACKNOWLEDGMENTS

THE members of the deputation wish to express their appreciation of many courtesies afforded to them in the visit to Switzerland and France.

MR. L. E. M. TAYLOR, of the Board of Trade, who acted as Secretary, was untiring in his efforts to ensure smooth working of the arrangements, and without his assistance a great deal of valuable time would undoubtedly have been wasted by the party.

MR. F. WALKER, Vice-Consul in Zürich, made all arrangements for necessary accommodation and had already prepared a very full itinerary of visits and assisted the party in every possible way.

Dr. WILLY BUCHI, Secretary of the Swiss Woollen Manufacturers Association, and MR. C. MEYLAN, Secretary of the Association of Machinery

Manufacturers, co-operated in every way to make the visit a success, and willingly gave many details affecting their respective sections of the industry.

To the Vice-Consul at Lille, MR. WILLOUGHBY, we desire to express our thanks for his co-operation in making all the arrangements for visits to our competitor firms in Roubaix and Tourcoing, and for his ready help in assuring reservations and a comfortable journey.

We express our appreciation to the Secretary of the Association of Manufacturers in Roubaix and Tourcoing for his assistance on our visit.

Lastly, we should not have fulfilled our duty if we did not express our thanks and that of the Wool Working Party to the many firms in both Switzerland and France who so willingly afforded us the opportunity of inspecting their factories and productions.

It should be stated that the delegates, on behalf of the Wool Textile Industry, expressed a hearty invitation that a reciprocal visit should be made to our Industry by representatives of the Wool Textile Industries of Switzerland and France.

INTRODUCTION

SWITZERLAND

IN general we must report the warmth, courtesy, and eager friendliness with which the group and its members were received everywhere they went. The Swiss people in the Zürich district at least are immensely grateful for what the British people did in 1940 and afterwards and seem to feel that the Swiss would go to almost any length to be closely identified with the future of Great Britain. They feel dangerously alone as an outpost of the democracy they believe in and they shudder for their future. We told them on every possible occasion how much the British appreciated the integrity of the Swiss neutrality and their determination to fight to the end defending their Swiss ideals and way of life. We saw precautions they had taken to destroy their transport system and much of their industry if they had been invaded and we told them we believed they would have done so if necessary. In the opinion of the visiting group our Government should pay great attention to strengthening ties in every way between individual Swiss persons and firms and British persons and firms as well as employers' associations and trades' unions.

On behalf of the Wool Textile Industry, at a dinner to which the two Trade Associations jointly invited us, we told them all this and invited the closest co-operation including visits to Britain in the near future. They reciprocated warmly and we recommend that everything possible should be done to strengthen Anglo-Swiss industrial ties, particularly in the Textile Industry.

FRANCE

FROM Switzerland the Wool Working Party Group travelled to France where again a series of visits to Wool Textile Firms had been most efficiently and happily arranged by the British Consul through the representatives of textile employers and trade unionists in the district covering Lille, Roubaix and Tourcoing. The technical details of those visits are also appended hereto.

The agony and bewilderment of the situation in this French district is very different from the wealthy bewilderment in Switzerland, but again the visiting group were immensely struck by the general eagerness of employers and trade unionists alike to make strong and enduring at every level the ties of friendship with Great Britain. Immediately we made arrangements by which reciprocal visits can take place and we trust that these arrangements will be implemented

not only by the Employers' Associations and Trades Unions concerned, but also by the two Governments. We were received officially by the Mayors of Roubaix and Tourcoing in their respective municipal headquarters, and there again we had evidence of the urgent and eager desire for close international co-operation with the British whom they undoubtedly respect. Our employer members had talks with a representative body of Roubaix-Tourcoing Chamber of Commerce Members while, meeting separately through lack of time, our Trades Union members talked with a representative body of full time Trades Union officials, with Mr. Willoughby, the British Consul, acting as interpreter.

There is little doubt in our mind that both employers and trades unionists in the Lille-Roubaix-Tourcoing district are quite convinced that there can be no going back to an industrial situation that for them has vanished for ever. They must go forward, and urgently. We were delighted with much evidence proving that there is willing co-operation at every level between the representative employers and trade unionists in that district, not only in regard to wages and conditions which are directly controlled by a Government Wages and Price Policy, but more importantly in evolving a system of efficient democratic control through which the workers are kept fully in the management picture yet the management is allowed the fullest possible opportunities for initiative. It is interesting to note that the regional and district war production joint consultation machinery for industry, that was copied from Britain immediately after the liberation, has been developed and strengthened, whereas the same machinery has so far been almost entirely neglected in post-war Britain.

IN GENERAL

AS the appended reports will show, there is a very considerable amount to be learned from our visits to the countries concerned, and such visits are of infinite importance. Nevertheless we return with an increased optimism in the future of Great Britain and British Industry, if only our British people, employers, trade unionists and politicians alike will make the final push together and keep the effort up consistently. In our British Wool Textile Industry in particular, we feel that we already have many good examples of the best in textile firms for the others to emulate.

LIST OF FIRMS VISITED IN SWITZERLAND

Zellweger, A. G. ..	Uster ..	Textile Machinery Manufacturers
Maschinenfabrik Rüti ..	Rüti ..	" " "
Sulzer Bros. & Co. ..	Winterthur	" " "
A. G. Adolf Saurer ..	Arbon ..	" " "
Schweiter	Horgen ..	" " "
Grob & Co., Ltd. ..	"	" " "
Staubli Bros. & Co. ..	"	" " "
Sam Vollenweider ..	"	" " "
Brügger & Co.	"	" " "
Schärer Textile Manufacturing Works	Erlenbach ..	" " "
Schütze & Cie	Zürich ..	Dyers and Finishers
Tuchfabrik Pfenninger & Co., A. G.	Wädenswil ..	Woollen Manufacturers
Vereinigte Kammgarnspinnereien	Schaffhausen	Wool Combing and Worsted Spinning

LIST OF FIRMS VISITED IN FRANCE

A. Prouvost & Co. ..	Roubaix ..	Commission Wool Combers and Worsted Spinners
François Masurel Frères	Tourcoing ..	Worsted Spinners
Mathon & Dubrulle ..	„ ..	Manufacturers

OTHER VISITS MADE IN FRANCE

The " Model Village " in Roubaix.
Conference with the Heads of Wool Factories.
Conference with the Workers' Syndicates.
Conference with Members of the Chamber of Commerce, Roubaix.
Visit to the Apprenticeship Centre, Roubaix.
Reception by the Mayor of Tourcoing.
Reception by the Mayor of Roubaix.

REPORT

ON the evening of Monday, 19th August, Mr. F. Walker of the British Embassy arranged for the mission to meet:

DR. WILLY BUCHI ..	Secretary of the Woollen Manufacturers' Association
	and
MR. MEYLAN ..	Secretary of the Association of Machinery Manufacturers.

The principal purpose of this meeting was to confirm the arrangements already made and complete the itinerary. As a result of our discussions many interesting details were made available to the members of the Mission which it was deemed advisable to record.

There are some 10,000 operatives in the whole Swiss Wool Textile Industry consisting of operatives who are members of Trade Unions, and many who are not members.

The Manufacturing Sections of the Industry are well organised at various levels and all the principal firms are members of their respective organisations.

Negotiations affecting wages take place between the parties concerned through their respective organisations. If agreement is reached the conditions of such agreements are implemented by the employers in those factories where there is a preponderance of operatives who are members of the Trade Union. In other factories it is customary for employers to follow the lead given but this is not compulsory. Should agreement not be reached by negotiation the matter is then referred to Government arbitration. The award of any such Arbitration Tribunal is binding on the parties concerned. Should any employers fail to conform to the conditions of the award, they are subject to fines for non-compliance.

The Trades' Unions Organisations are in the process of development. In the large cities such as Zürich and its environs the organisation of labour has materially increased, which is not the case in the smaller and outlying districts.

The working week of all wool textile factories throughout Switzerland is fixed by statute at a maximum of 48 hours, which may be worked in either 5 or 5½ days. There has been a recent development whereby some firms have changed to a 5-day week but this would appear to be in the nature of an experiment.

A general average of wages was quoted as:

Males :

400 to 500 francs per month
or 100 to 125 „ week .. £5 15 11 to £7 4 11 per week.

Females :

300 to 400 „ month
or 75 to 100 „ week .. £4 7 0 to £5 15 11 per week.

The textile factories vary in age from 20 to 50 years. During the war, manufacturers took advantage of the opportunity to extend and modernise their factories, this being made easier by the methods of taxation relief afforded by the Government.

Plants are almost exclusively driven either by electricity or by water conversions. The system of driving adopted is both of group and individual drive but all developments are exclusively confined to individual drive.

The textile machinery manufacturers are well organised on a comprehensive scale and include manufacturers of all types of machinery for whatever purpose. The organisation consists of various sub-groups of which the Textile Machinists is one group representing some 12 per cent of the whole.

Prior to the war, the exports of machinery increased to 75 per cent of the total production, and in the case of textile machinery, to a larger percentage, but the exact figure was not ascertainable. During the war and up to the present time the figures have declined considerably to about 40 per cent of total production. This is now increasing and is expected to continue to increase.

The textile machinery manufacturers are stated to have orders on the books which will absorb the production of the next two to three years.

Owing to the material decrease in exports during the period of the war, the Machinists have been able to re-equip their works to a considerable extent and the taxation policy of the Government has encouraged the re-tooling and replacement of machinery.

There is no central body or organisation dealing with machinery research, but the larger firms of machinery manufacturers have their own research departments. There is a large measure of co-operation between all types of machinery manufacturers whether for the Wool Textile or any other industry.

The industry is developing the idea that when students attain school-leaving age those who are considered suitable should enter the Machinery Industry. If during a period of nine months they show an aptitude for this particular work, and desire to do so, they may qualify for entry to full time technical education for a period of three years.

The average operative in the Machinery Manufacturing Industry receives 96 francs per week .. £5 11s. 4d. There is no national policy in respect of a guaranteed wage.

It was emphasised that a large number of orders had been received from textile processors in Great Britain, but they had received numerous complaints that firms had not been successful in obtaining import licences. Such

countries as France, Belgium, and Holland, also South America and other countries interested in the development of their respective Textile Industries, do not appear to be frustrated by similar restrictions.

NOTES OF VISITS TO TEXTILE MACHINERY MANUFACTURERS IN SWITZERLAND

IT is deemed advisable to mention certain features of the machines inspected so that a permanent record may be available.

Automatic warp tying machine.
Automatic reaching-in machine.
Warp leasing machine.
Sleying machine.
Various testing machines.

These are all very neat and well-designed accessories which could, we think, be used with advantage by many more firms in England than at present, especially the combined automatic reaching-in machine and sleying machine, which enables an operative to draw in through droppers, healds and reeds, in one operation.

In addition, many types of instruments for testing were shown.

AUTOMATIC WARP TYING MACHINE

THREE types of model are manufactured.

1. To tie in warp without lease.
2. „ „ with „
3. Combined for tying in either with or without lease.

It is claimed by the firm that these machines do the work of eight to ten twisters-in.

The minimum space required is 10 in. between the flanges of the warp beam.

The machine is intended for use either in the preparing room or at the loom.

AUTOMATIC REACHING-IN MACHINE

WITH this machine the required thread is selected by the machine and the operative selects the heald and draws through the end.

COMBINED AUTOMATIC REACHING-IN AND SLEYING MACHINES

THE machine selects the required thread and dropper and the operative draws in the thread through the dropper and through the eye of the heald. The sleying device then sleys the end through the reed.

This combined machine does not appear to justify itself as the time saved by the sleying in portion would not effect much saving of time or labour.

The machines can be used either as a combination or the two portions, i.e., reaching-in and sleying separately.

The reaching-in machine is for use apart from the loom but the sleying or denting machine can be used either at the loom or apart.

It is claimed that sleying can be done at the rate of 3,000 ends per hour.

Transformers are fitted to all machines and also they are equipped for running at any one of three speeds.

VARIOUS INSTRUMENTS WERE INSPECTED

Tension Testing Instruments (2 models)

THE purpose of one is to test the maximum tension of a thread, whilst the other indicates the average tension.

Both instruments can be adjusted for yarns either at high or low tension.

Instrument to measure length of fibre

The instrument " draws " the fibres from the staple and measures the various lengths of fibre showing also the percentage of each length of fibre in a particular staple.

For testing evenness and regularity

An instrument was examined which can be used for testing either a top sliver, roving, or yarn, and by an adjacent instrument the evenness and irregularity is recorded on a graph showing the state of the material tested at each successive millimetre.

IT was intimated that production of these accessories was delayed principally due to delay in delivery of iron and steel from England.

THE Deputation next visited a firm making high speed warping machines and looms.

UNIVERSAL SECTIONAL WARPING MACHINES WITH MOVABLE BOBBIN CREEL

THIS well designed machine is, in our opinion, a very excellent example of the improvements which can be incorporated in textile machinery by the use of mechanical or electrical methods to carry out all possible manual operations examples of these being :

1.—Removing beamed warp from machine to truck by one man only, by movement of a lever.

2.—Creel movement by electric motor controlled from a point convenient to the operative.

3.—Keys on reel all set at one operation to any desired height up to 4¾ in. by means of a spiral disc controlled from one central position.

4.—Electrical individual warp stop motion with light signals for each row of bobbins.

For warpings in sections at high speed.

The normal speed is 300 yards per minute.

The maximum speed is 500 yards per minute.

The maximum number of ends per section is 480.

Reserve cones can be brought into operation as used cones run out.

Any balances of yarn on cones are usually rewound.

The present package on cone is 1 kilo—250 grms.

The machine is fitted with an electric counter for measuring the length of the first section.

There is a variable gauge for use with various ends per inch in the section and which is adjusted according to the count of yarn used.

Beaming may be done at slow or fast speeds.

LOOMS

WE next inspected some examples of extremely neat and well designed looms on similar lines to those made in England, but with low frames and a complete absence of all overhead gear, which creates a feeling of space and comfort in the weaving shed, which must be seen to be appreciated.

The looms are fitted with mechanical warp stop motions, and two weft forks which, in the event of weft breakage, stop the looms immediately, the sley being automatically placed on the back centre with the broken pick in the open shed.

All looms are fitted with a positive let-off motion, individual electric motors, V-belts and cone friction clutch.

Looms can be supplied in reed widths up to 100 in., and the heavy automatic looms up to 120 in.

These are available with either automatic bobbin or shuttle changing mechanism according to the model, and with various types of boxing including pick-and-pick on certain models.

The position of the dobby is at the end of the loom, and is easily accessible, being level with the top of the loom frame. Dobbies are of the positive type, and the healds and shafts are easily detachable.

As an indication it should be stated that the light automatic loom, fitted with four boxes, was running at 120 picks per minute in a 76 in. Reed Loom.

One interesting Automatic Shuttle Changing Loom is fitted for use with flat bobbins, and it is claimed that in average worsted counts the bobbin carries 50 per cent more weft than the normal round type.

GENERAL REMARKS

THIS firm emphasised that its customers in Great Britain were experiencing considerable difficulty in obtaining import licences. Many orders had been placed by British manufacturers which had no material value, as they were placed subject to obtaining import licences. A few licences only had been granted and orders confirmed. It was suggested that it would be an advantage if import licences could be spread in order to enable various processors in Great Britain to test out the various types of machinery.

Delivery required at present is 2–3 years, according to type of machine required.

Emphasis was placed on the fact that production is being exported to other countries, where import facilities are made available to them, and that this must eventually have its effect on the Wool Textile Industry of Great Britain.

The greatest shortage of labour is in foundry workers.

At the showrooms of the largest general machinery maker's works in Switzerland we inspected a most interesting loom, or " Weaving Machine " as they prefer to call it, which is still in the experimental stage, but is considered by the firm to be nearing completion of this stage. It is an excellently designed machine, with many novel features, and some details are given below.

Carrier—consists of a small metal shell about $2\frac{1}{2}$ in. long, $\frac{7}{16}$ in. wide, and $\frac{3}{16}$ in. thick with a gripper at the rear to grip the weft while conveying it across the loom.

Giver—gives the weft to the carrier which it takes from the cone placed on the right of the loom.

Shuttle Race—consists of a series of steel angle frames about $\frac{3}{64}$ in. thick, spaced at $\frac{1}{4}$ in. intervals across the machine and carried by the sley in such a position, that on the back centre they are in the shed, but as the sley moves forward for the beat up, they pass between the warp threads forming the bottom of the shed, and allow the beat up to take place in a normal manner.

Shuttle Driving Force—consists of a bar of spring steel approximately 16 in. long by ½ in. diameter, which being held at one end is given a torsional strain as the sley returns to the back centre. At the correct moment, the energy stored in the shaft is released and drives the shuttle across the race by means of a steel lever about 7 in. long, the amount of energy stored in the shaft being regulated by turning the fixed end.

The shuttles (8 to 10 in number are in circulation, depending on the width of the machine) are returned to the magazine by an endless chain placed below the shed and on the sley. On arrival at the magazine, they are picked up by the transfer unit and replaced in position ready for feeding up to the giver with their grippers open. Immediately the shuttle is in position with its grippers closed and holding the weft, the giver gripper is opened, thus allowing the shuttle to move freely across its race, carrying the weft with it.

The loom is built on low lines, similar to all other Swiss makes, every motion being very accessible and of very neat and efficient design. Heald shafts are worked from below by racks and quadrants, each shaft being controlled by two racks and tappets or cams, so designed that a very smooth motion is given to the shafts.

Picks 240 per minute when weaving cloth 48 in. wide. Weft changing giving pick and pick effect can be fitted, also they can arrange for any number of colours up to 10 or more being delivered to the shuttles in any order that may be required, by mechanism worked on the Jacquard principle.

Note :—With the turning in of the weft ends a thick list is formed which may be unsuitable for fine worsteds that require close cropping. As an alternative they have developed a mock leno type of selvedge, the loose ends being cut by a revolving cutter, to give a fairly neat edge.

We consider this machine to be the most interesting development that has come forward in the textile industry during the last few years, and even in its present stage it has many practical applications.

The weaving machine is fitted with automatic warp tensioning and the tappet box is fully enclosed.

The weft runs from large cones placed at the end of the machine.

Beam flanges are up to 23 in. in diameter.

Present limit of shafts is 8, but there is no difficulty in increasing the number.

No diagrams or literature are yet available, but will be sent to us later, and this should be followed up at a later stage.

GENERAL

ENORMOUS sums of money have been spent on the development of this machine. No idea can be given of the ultimate price, and it remains to be seen whether the cost will be justified in the ultimate efficiency and production capacity of the machine.

It was noticed that the walls of the experimental room had been surfaced with a sound-reducing material supplied by Cellotex Company Ltd., North Circular Road, Cricklewood, England. It is about 1 in. in thickness and made of compressed wood, etc., fitted in panels, and each panel has a series of small holes to absorb sound.

A visit was next made to a firm making only LOOMS.

The model made by this firm is of a standard design which can, by the addition of supplementary mechanism, be converted into Automatic Bobbin

Changer of the Northrop design, or Automatic Shuttle Changer of their own pattern. It is of low construction about 30 in. to the top of the breast beam, without any overhead frame or fittings. It is of very rigid construction and, due to all parts being produced by precision methods, and having machine cut gears, roller and ball bearings, it is a very smooth running machine. It is, in fact, a very good example of what can be accomplished with good design and workmanship.

Important constructional details to be noted are the following:

Individual motor and V-belts with steel brake band and patent motion for turning backwards.

Going apart—Gear driven at both sides.

Warp let-off motion—Positive with spring controlled regulator depending on warp tension.

Take-up Motion—Positive with clutch slip device for cloth beam.

Warp Stop Motion—Mechanical or electrical.

Weft Stop Motion—Central or side weft fork as desired.

Heald Shafts—Positive control by bell-cranked levers under loom, and tappet motion fitted on side of loom very accessible, or double lift open shed dobby also fitted.

Standard Non-automatic Loom—Drop boxes up to 4 boxes each side.
Maximum capacity up to 29 shafts.
69 in. reed to run 150 picks per minute, 9,000 Swiss Francs = £522
Dobby extra 1,400 Swiss Francs = £81

Automatic Single Shuttle Tappet Loom:
78 in. reed to run 140 picks per minute, 8,000 Swiss Francs = £464

Automatic Loom, 4 boxes by 1 box:
Colours fed in desired rotation on belting.
66 in. reed to run at 130 picks per minute, for Boxing 2 by 2 etc.
Maximum 4 colour.
Maximum 29 shafts 9,000 Swiss Francs = £522
Dobby 1,400 Swiss Francs = £81

Heavy Woollen Type Loom—135 in. reed, to weave at 88 picks per minute.
Made in all the various types. Suitable for cloths up to 32 ozs. per yard.
Prices 50 to 60 per cent higher than the lighter worsted type looms.
Widths of looms vary every 10 centimetres.
Difference in prices for varying widths is not great.
The dobby is operated by cards instead of lags, and a small card cutting machine is available.

The firm will not accept orders unless the customer has an import licence, and it was pointed out that orders for Great Britain could not be accepted at present, as the necessary import licences were not available.

They are exporting at present to Sweden, Portugal, Czechoslovakia, Brazil, Argentine, Chili and Peru.

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It is interesting to note that certain firms in Horgen who are non-competitive have co-operated in establishing a combined showroom for their finished products. This was of great convenience to the mission, and would be to any potential buyer visiting Horgen.

It was also pointed out that although the group work collectively there is no financial or other connection between the firms.

The mission, however, also visited the works of firms making winding frames in order to go round the works and see the machines under construction.

The members of the mission had a general discussion with members of the group, when it was emphasised by them that their customers in Great Britain were having considerable difficulty in obtaining import licences, which was resulting in their production being exported to other countries. Mention was made of the fact that where import licences had been granted, the period of their validity was too short owing to the long delivery required by the machinery manufacturers. The usual period of validity granted is one year, whereas delivery required varies between two and three years. If this difficulty could be relieved, the firms would be glad to reserve capacity of production, as they are desirous of accepting orders from Great Britain.

Owing to the shortage of labour, production was some 85 per cent of pre-war production. The shortage existed principally amongst skilled mechanics and foundry workers.

It was stated that juveniles were going into the building trade or into watch and clock making, also into newly established industries making goods which before the war were purchased abroad. These industries are paying higher rates of wages.

In the combined show rooms were installed winding machines, and various accessories as detailed below :

Winding machines.

Drawing-in frames, healds, light metal heald shafts, etc., single cylinder double lift dobbies, card cutting and card copying machine, patent spring reverse motion for lowering the shafts and universal shuttle trueing machine.

Cloth shearing, reed cleaning and polishing machines.

One of the four firms in the group are makers of automatic winding machines for cheese and cone winding, also doubling machines.

Machines were well made and a good standard of workmanship.

There were no fundamental differences from our home produced machines.

One firm specialises in loom accessories, such as

HEALDS AND HEALD SHAFTS

SHAFTS are unbendable and made of cast aluminium with uprights made of compressed wood, and are very rigid.

They are fitted with movable hooks for raising or lowering position of the frame, and sliding hooks in order to support the runners for the healds.

Highly polished flat HEALDS, twisted to give opening for the eye of the heald.

Each heald is alternated forwards and backwards making each one more accessible.

Replacement healds have an open top to facilitate easy insertion.

Delivery required is six months, but would supply sample sets in three months.

The length of healds is standardised and measurements are between the end loops.

For cotton	280	300	330	millimetres
For worsted	380	420	450	„
For woollen	380	420	450	„

The thickness of the uprights is made according to the pitch of the dobby.

There is a simple method of inserting guiding threads through the eyes of

the healds and across the healds, thus supplying a rest for the needle or hook of the reacher-in.

The firm supply a very neat and efficient adjustable frame for use when drawing in.

We also saw BEAM STANDS with variable bushes for use when tying in warps.

They also supply DROPPERS for mechanical stop motions.

They are specialists in healds and shafts for the making of leno weaves which are suitable for wool, silk, rayon or cotton. This is very cleverly devised and should be seen by those interested in this type of weave.

ANOTHER firm specialises in DOBBIES.

The efficiency of these dobbies could only be tested by experience, but they are well constructed in every detail.

THE next firm whose products we inspected, specialises in shearing or cropping machines for use in the finishing of wool textiles, and also in machines for cleaning reeds by brushing. These are described below.

AUTOMATIC REED CLEANING MACHINE

THE machine is fitted with rotary brushes which are supplied in either horse-hair or steel wire and traverse the reed automatically.

It is primarily designed for the more modern type of cast aluminium frame, but they supply an adaptable cover for reeds made with a pitch baulk.

Rust remover or light oil may be used in the case of reeds which have got into bad condition with rust.

There is also available an appliance which can be used for polishing the surface of the reed.

The machine would not appear to be a justifiable purchase except in the case of large firms, or for a firm who would undertake the cleaning of reeds for the trade in general.

NON-AUTOMATIC REED CLEANING MACHINE

MOTOR operated rotating horse-hair or steel wire brush.

Traverse of brush to be operated by hand.

SHEARING OR CROPPING MACHINERY

MACHINES suitable for either woollen or worsted.

The main point of interest is the automatic stop motion which comes into operation when the seam passes the cropping knife. This is operated by the automatic dropping of the shearing table.

CHAIN STITCHING MACHINE

THE purpose of this machine is for the seaming together of the ends of pieces with the raw ends doubled in. The stitch is easily removable due to the type of chain stitch.

Similar machines are available in this country.

(A visit was also made to another firm in the district, making automatic winding machines, this firm not being a member of the group.)

AUTOMATIC WEFT WINDER

THE chief point of this machine was a large capacity magazine holding 28 pirns. It can be arranged to wind on wood bobbins or paper tubes of any shape or size, and will wind with or without bunch.

A very high speed winder, maximum speed 8,000 r.p.m., the speed being limited only by the quality of the yarn.

Speed can be varied according to type and quality of yarn to be wound.

The machine is of simple construction and its composite parts are well made.

Can be used for winding either for cone or cheese.

The bobbin is held at each end, giving a firm and steady wind, and the proprietor claims to be the originator of spindleless winding.

OUR next visit was to a firm who concentrate on automatic winding machinery.

The non-stop AUTOMATIC PIRN WINDER made by this firm is of simple construction, but extremely efficient in action. Its construction is such that all parts are interchangeable and so assembled that complete units or sub-units can be replaced with a minimum of trouble.

The machine is of a high standard and the closest possible attention is given to every detail in the process of its manufacture.

The magazine of the automatic winder carries seven pirns, but accommodation is available for further supplies in order to facilitate the feeding of the magazine.

New bobbins are fed in a fixed position which is considered necessary to ensure a safe change.

Tension is adjusted as the thread is fed to the bobbin.

Support of the bottom is of the spindleless type, the bobbin being held securely at each end.

Suitable for winding from cheese or cone.

Approximate price, £40 per spindle × 10 spindles per set = £400.

The firm is experimenting with an AUTOMATIC WINDER FOR TUBULAR COPS, but this is not recommended at present for worsted yarns. At present only recommended for very strong thick yarns.

They have also a PIRNLESS COP WINDER which operates at high speed. The cops are used in a closed shuttle, the thread being drawn from the centre of the cop. The machine is fed from any type of package, either cone, cheese, or four end linked caps.

Delivery required is approximately 2½ years.

All orders are booked subject to the buyer obtaining import licence 12 months prior to date of delivery.

One automatic winding machine would serve about 16 automatic looms.

One girl can mind 30 spindles, winding from cone.

Owing to the particular hardening process through which the machine parts passed, this winder should have a longer life.

The firm is producing nine to ten machines per week at present, but in two years' time, production will have increased to double this output.

THIS concluded our visits to the machinery manufacturers, and attention was next given to the opportunity afforded to us by three firms of processors to inspect their factories.

NOTES OF VISITS TO PROCESSORS

ALTHOUGH the visit to the first firm was of general interest, it was not observed that there were any fundamental differences from our own dyeing and finishing plants.

DYEING AND FINISHING MILL

THE building is lofty, with good natural light; of reinforced concrete construction, rooms about 15 ft. high from floor to underside of roof trusses. Concrete

floors, walls concrete faced and painted white. Electric light. Rooms generally very clean. Layout of machinery efficient and well spaced. Steam in washing and dyeing room very bad, making working conditions not too good. This could be improved by blowing in warm air and so dispersing the steam vapour.

All machines with electric drives, mostly individual motors.

The firm have commenced to instal stainless steel dye-vats and washing machines which are totally enclosed.

The outstanding machine was one which rigged the piece, cuttled it and at the same time inserted the press board between the cuttles, each press board being lifted by suction pads. The machine worked efficiently and was made by Rassweiner Maschiner Fabrik, A. & G., eliminating all hard work except for pieces which were drawn.

THE second visit was to a firm of:

WOOLLEN MANUFACTURERS

STORIED mill, each floor about 14 ft. high, ample spacing for machines. Well lighted by daylight and electric. Machines mostly fitted with individual motors. Air conditioning by Sulzer (cleaned and washed). Concrete floors and cement rendered walls, walls painted white. Humidifiers in spinning and weaving departments.

Blending and willeying departments not inspected.

Carding Department

Continental type of machines. Old machines with hand feed to single scribbler, which was fitted with automatic lap drum at the delivery end. Intermediate with hand feed and endless cloth lap former at delivery end. Carder with two lap feed and tape condenser about 120 ends. Machines about 54 in. wide, made by Oscar Schemmel & Co in 1910.

One modern set made by Richard Hartmann, 72 in. wide similar section to the above, but with automatic feed to scribbler and straight fibre broad band feed between scribbler and intermediate. Tape condenser with about 160 ends to carder. Followed by mule spinning, spindles 2 in. pitch.

Worsted Department

One small set of French Drawing made by Elsessiche Mulhausen, followed by worsted ring spinning frame made by Rieter and mule spinning. Rieter frame had 288 spindles, 3½ in. centres, rings 2½ in. diameter, bobbins 10½ in. long, five lines of rollers, spindle speed 4,000 R.P.M. but depends on counts and twist required, variable speed, motor drive. Worsted mules with five lines of rollers made by Elsessiche Mulhausen in 1917.

Doubling and Twisting Department

Double and twisting machines made by Harnal of Arbon. The machines were reasonably spaced, the rooms very clean and fresh-looking.

Weaving Department

Winding Frames made by Schärer.

Warping and beaming machines by Rüti.

Note:—This machine gives three times the production of their old machines.

Weavers beams stored on motor driven vertical revolving creels.

Jacquard selvedge harness arranged to fit on overhead rails which run the

full length of a row of looms, thus the harness can be moved and fitted to any loom in the row.

Jacquard harness made by Grob & Co.

Platform between rails for man to walk on.

Cropping machines made by S. Vollenweider of Horgen.

Double teazel raising machine made by Ernest Gessener.

The fluff from both machines was removed by vacuum.

Tentering machines made by Kelling & Braun.

Note :—The first floor weaving room is heated by warm air taken from the tentering machine.

The proprietor expressed the opinion that the best and fastest woollen card was made by Duesberg, of Verviers.

OUR third visit was to a firm which undertakes :

WORSTED CARDING, COMBING AND SPINNING

STORIED mill with sorting room on top floor (women sorters).

All rooms about 14 ft. 6 in. high, with large windows fitted with clear glass. Concrete floors, walls cement rendered and painted white. All rooms and machines are extremely clean. Motor-driven (mostly individual). Ventilation by Sulzer, air washed before delivery into rooms, and electric light.

Plant Layout

This appears to be very good, but rather difficult to estimate accurately as we were taken through the various departments in a somewhat haphazard manner.

Washing Department

Washbowls about 40 in. wide, five bowls to the set, water delivered to fifth bowl and out to sump at first bowl. A modified desuinting system of washing in first bowl. During the war a grease extraction plant was in use, but this has now been dismantled and taken away. Soap and soda delivered to bowls in pipes, each pipe being painted in a distinctive colour, i.e. soap, yellow; soda, white. Dryer—woven lattice type made by Bernhart. Working temperature 50° C. Output about 450 lbs. per hour. The wool was blown from the dryer and delivered to circular cages placed over the hoppers of each card. Cage about 4 ft. deep[1], with door in bottom, allowing operative to drop wool in hoppers as required.

Card Department

Two rows of carding machines. Eight machines per row. Single cylinder type with breast licker-in. Four workers and four strippers over cylinder, two workers and two strippers over breast, one worker and one stripper over licker-in. Small doffers about 27 in. dia. Fancy and last worker with cover. One burr beater and scraper to licker-in. Fly comb and calendar delivery to railway balling head.

Note :—Seven cards working, one grinding, doffers driven by gear from cylinder. Production per card on 10 to 12 months Cape 70s quality, about 30 lbs. per hour.

Preparing and Combing Department

Two intersector gill boxes before combing made by Schlumberger.

[1] 4 ft. 0 in. dia.

42 combs, narrow model made by Société Alsacienne. One intersector gill box after combing. Backwashing of the usual continental type, with steam heated direct contact dyers. Two intersector gill boxes after backwashing.

Drawing and Spinning Department

French drawing sets all made by Société Alsacienne.

Mule spinning, five lines of rollers also made by Société Alsacienne, driven by line shaft. One motor to six mules.

Winding and doubling frames by Harnel of Arbon.

Note :—In the winding room, re-built after bomb damage, a composition wood floor has been laid. This has been in use about 12 months and considering the light wear it has had to stand, does not appear to be successful.

Note :—About three per cent emulsion was added to the wool as it left the dryer and a little also applied to sliver at the first gilling of the French drawing (percentage not known).

Doffing of balls in combing department with the semi-automatic device.

VISIT TO COMMISSION WOOL COMBING PLANT

IT was intimated by the principal of the firm that it was not usual for the firm to allow competitors to visit their works, but he was pleased to make an exception in this case of the Wool Working Party.

It was only possible to see the commission wool combing section of the firm, as the spinning section was situated in another mill some distance away.

The firm employ some 300 sorters and the total number employed is approximately 2,300 in the combing section and 3,000 in the spinning section.

This is the largest mill in France, and is built on standard British lines, i.e., warehouse at one end with wool sorters in the top floor, wool being dropped through trap doors in the floors to blends, and then from the blends taken to a single spiked cylinder willey, which is fed by a hopper. The wool then drops from the delivery end of willey direct into first-bowl of washing. After washing and drying it is then blown to bins adjacent to the carding machines, the carding machines and all following machines being in the shed.

Building in good condition, all rooms being about 15 ft. high.

Sorting room with many side windows and north roof lights.

In the mill inspected there were 6 sets of washing, each set consisting of a Mallard desuinter followed by 5 washbowls about 3 ft. wide, and dryer. (In the set seen, the dryer was the new single lattice type made by Hunter of U.S.A.)

Carding and Combing Department

Carding machines were mostly of Messrs. Platt Bros.' make or copies made in their own workshop, and consisted of 3 cylinder 50 in. diameter, 3 doffers 40 in. each with 4-workers and 4-strippers.

Third and second cylinders about 105 r.p.m., first cylinder about 60 r.p.m., 60 in. wide delivering to both railway balling heads and coilers, each card fitted with 2 burr beaters and long harmels burr crushers. Two intersector gill boxes before combing. French combs, both wide and narrow models. Feed, 32 ends per comb. One intersector gill box after combing. Backwashers with 2-bowls and T.W. 12-cylinder drying units, followed by 3 head intersector gill boxes. Two intersector finishing gill boxes.

All the machines were well spaced and in many cases fitted with individual motors.

In the carding room there was a large amount of " Fly " and it was explained that this was due to shortage of oil.

General Remarks

In our opinion this particular mill was too large for economic control and we would, in general, recommend that the most suitable size for efficient management is a plant consisting of say 36 Noble combs or approximately 72 French combs.

VISIT TO FRENCH DRAWING AND SPINNING MILL

THIS storied mill was well built, and ample space had been provided everywhere, i.e., main staircase and passages very wide, room 15 ft. 6 in. high, and well supplied with windows.

Boiler Plant

Stirling boiler, with automatic firing and ash removal. Ash lifted by elevator into hopper and dropped direct into railway wagons without handling. Two turbines and generators each of 4,000 k.v.a.

Ventilation by fans in most rooms.

Humidifiers in most rooms.

Process Plant : French Drawing, Spinning, Doubling, Twisting and Winding, Dyeing

French Drawing—8 and 9 operations per set, made by Société Alsacienne. 6 intersecting boxes and 3 or 4 porcupine drawings, followed by mule spinning with 5 lines of rollers—spindle pitch, 1¾ in.—made by Andre Kochlin Mulhause. Ring spinning with 5 lines of rollers. Hartmanns machines preferred to any others in their possession, but they think Reiters of Switzerland the best.

Doubling, Twisting and Winding—Many makes, nothing of outstanding interest, but good layout and manual labour reduced to a minimum by conveyor systems wherever possible.

In mule spinning there were 4 operatives watching 1,200 spindles.

Dye vats were stainless steel and had a capacity of 600 lbs. per shade. The vats were their own make.

They are worsted spinners specialising in fancy yarns of various types, and under normal conditions they produce some 40,000 different types, including knops, slubs, crepe yarns, gassed and ungassed, cable yarns, screws, etc.

There is no firm known in Great Britain working even under normal conditions anything approaching this variety.

In pre-war days the firm sold large quantities of yarn for the ladies' trade in Great Britain.

Inspection of the preparing, spinning and winding department did not show that any special machinery or methods were employed different from those existing in the wool textile industry in our own country.

It was noted that they had a few new winding machines made by Schärer of Switzerland.

VISIT TO WORSTED SPINNING AND CLOTH MANUFACTURING MILL

THERE is a firm of worsted spinners and manufacturers making both worsted and woollen yarns and piece goods. They have their own finishing and dyeing. In the time available it was not possible to visit their spinning factory which was some distance away, so attention was confined to the winding, warping, twisting, weaving, burling and mending, and dyeing and finishing operations.

The firm have 900 looms, and at present only 400 are running.

On the standard type of looth they weave two looms per weaver, and in automatics 6 to 8 looms per weaver, according to type of work.

A local firm undertakes the conversion of non-automatic looms to automatic, and this is a matter which should be the subject of enquiry with our own machinery manufacturers.

In the weaving section of the firm the impression gained was that the majority of the looms were very old and out of date, and this applied also to the dobbies. There was a variety of makes of looms, chiefly Northrop, Crompton and Knowles, and Hattersley. The machines were overcrowded and space behind the looms considered inadequate by our normal standards. The width between the beam flanges was in most cases *only* 11 *in.*

Warping was in operation on old machines, running at slow speeds, but it was noted that three new warping drums were being delivered, but our guides could not give any information as to the origin or make of these.

In the burling room, the menders have no tables and sit huddled over their work, with a portion of the piece on their knees. We commented on this, and were assured that the menders prefer this method, but it appeared to us much less efficient and undoubtedly not in the best interests of the comfort and health of the operative. Menders are all on piece work, and when mending is rejected by the passer the work has to be redone at 50 per cent of the normal rate.

The firm are in process of re-equipping the dyeing department and have introduced the first batch of stainless steel dye vats, made by Kruts, which they consider very good and efficient. This would appear to be very necessary as the wooden vats have deteriorated seriously owing to their disuse during the war period. Small stainless steel vats have been installed for the dyeing of patterns. The new vats are supplied by Librecht, Roubaix.

An interesting and efficient machine was seen in the pressing department which rigs the piece, cuttles it, and at the same time inserts the press boards between each cuttle. The machine is supplied by Rossweiner Machinfabrik.

This mill is in the process of re-organisation, and it is their intention to re-plan all the various departments and instal ventilating units, humidifiers, and improve the lighting where necessary.

CONFERENCE WITH PRINCIPALS OF WOOL FACTORIES IN FRANCE

In the Chair—MR. MAURICE DUBRULLE

THE proceedings constituted an informal discussion, when we were given the opportunity of asking any questions which arose in our minds as a result of the visit.

It was ascertained that there is no research association or organisation of any kind connected with the Wool Textile Industry in France. Discussions are taking place at present with a view to some association being established. The principal difficulties with which the Industry is faced are shortage of labour, coal, dye-ware, some types of raw material, lubricating and processing oils, and sulphuric acid for carbonising.

On account of the use of " burry type " of wool, an adequate supply of sulphuric acid is essential. They are experiencing trouble with oxidisation due to the use of substitute processing oils.

The chief bottleneck is in wool combing which is only done for French processors.

Although the supply of wool is rationed to processors, they each receive an adequate supply of raw material.

The French machinery manufacturers are compelled to export 70 per cent of their production and the principal market to which this is exported is South America.

In regard to relations between employers and workers, it was stated that a trades' union secretary may interview an employee in the works, but only with permission of the principal of the firm.

Works Committees in each factory are established by Statutory Order and deal with matters other than wages. Workers are appointed to the Committee by popular vote. Conclusions arrived at by the Committee are made as recommendations, and in case of disagreement the matter is referred to the official organisation of the employers and trade union. Any dispute involving the threat of a strike amongst workers is referred to the Minister of Labour who will appoint an Inspector of Labour to act as conciliation officer. The Minister of Labour may make a final decision which is binding on both parties.

The employers expressed their satisfaction with the usefulness of the Works' Committees, except in cases where political influence was brought to bear by the workers' representatives.

The employers' organisation is equivalent to the Employers' Council, but they rely on the Chamber of Commerce to deal with commercial matters.

The Chambers of Commerce are official bodies covering various industries and have sectional committees to deal with matters affecting a particular industry.

The French Government have set down a scale which varies the rate of wages in different areas in order to equate the value of wages in these areas according to the relative cost of living.

Although wages are negotiated between respective organisations, the Government have powers to govern rates of wages. It may vary wages by decree.

In Roubaix and Tourcoing the total operatives in the weaving section are stated below, and it was estimated that other sections had a similar relation :

1928—28,000 Weaving section only
1938—20,000 „ „ „
1946—13,000 „ „ „

It is estimated that it will take some 4-5 years in order to reach the same number of employees as in 1938.

The total operatives in all sections in these regions are :

1938—130,000
1946— 75,000

It was observed that in French mills there were no canteen facilities and washing and lavatory facilities leave much to be desired.

VISIT TO THE APPRENTICESHIP CENTRE

This has been established by the employers in the Wool Textile Industry, of Roubaix and Tourcoing. It consists of a school and machinery in the weaving section.

The centre is governed by an Apprenticeship Committee composed of employers and workers, and staff of the centre.

The principal purposes for which it was founded are :

(*a*) To establish the foundation of good citizenship.

(*b*) To give children the means of making a career for themselves.

Its origin was to prevent the German authorities sending children away during the occupation.

The work consists in giving good education to children and training them to become operatives in the weaving section of the Industry.

There are similar schools for other sections of the Industry.

Students enter at the ages of 14 to 17 and stay for one year only. They spend 20 hours per week in the school and 20 in the workshops.

One hundred students passed through the Centre in the first year.

The course is split up broadly as follows :

2	weeks	—welcome and visit to mills.
4	„	pre-apprenticeship first stage. Principles of weaving on hand machine.
4	„	pre-apprenticeship second stage. Principles of weaving on power machine.
*12	„	practical weaving on 1-shuttle loom—plain.
*12	„	„ „ 2-shuttle „ „
*12	„	„ „ circular box „ and dobby.
*10	„	„ „ pick and pick-automatic plain and dobby.

56 weeks

Students then sit for their final examination.

They are then placed in factories and have the opportunity of choosing to which factory they will go.

We were shown the curriculum for students whilst in the school, which embraced many subjects covering amongst others :

The teaching of good citizenship.
The importance of family life and responsibility.
French national life.
History, including national and local matters.
Geography.
Morals of life.
Mathematics.
Physics.
Hygiene.

The hours of the school and workshop are 8 a.m. to 12 p.m. ; 1.15 p.m. to 5.15 p.m.

Lunch is provided free of charge.

The school is equipped with rooms for manual joinery, ironwork, and electricity, where simple handling and use of tools is taught and practised.

On the practical side of their training and before they go to the Instructional Shed, the students are taught the simple rudiments of weaving so that they first master the basic principles. They are taken through easy stages on hand machines to the more complicated type of weave on power looms.

1. Students are interested in simple operations on coarse hand frames, etc. They do hand warping, darning, sleying, reaching-in, etc., and finally hand loom weaving.
2. The next development is their work on hand looms with check designs.
3. Learn to tie up ends correctly.

* During this period the students also take a course in textile subjects.

4. Learn weaving for power looms.

5. They enter the power loom instruction shed.

The members of the mission only had the opportunity to visit one of these centres but they exist for various sections of the industry. Although these centres only started a few years ago and were originally established as a means of preventing children being sent away during the occupation, the experiment is considered by the employers to be very successful.

Employers contribute to the upkeep of the centre and students receive remuneration whilst taking their 56 weeks' course.

The recently revised rates are as follows :

COMITE INTERPROFESSIONEL APPRENTISSAGE, ROUBAIX–TOURCOING

New rates payable to Students whilst at the Apprenticeship Centre for a 40-hour week (5 days of 8 hours).

AGE		BOYS		GIRLS	
Yrs.	*Mths.*	*s.*	*d.*	*s.*	*d.*
14	0	23	6¾	21	3½
14	3	24	10	22	5½
14	6	26	0	23	5½
14	9	27	2½	24	5½
15	0	28	4½	25	7½
15	3	29	6¾	26	7
15	6	30	9	27	7
15	9	31	10¾	28	9
16	0	33	1	29	9
16	3	34	3½	30	11½
16	6	35	5½	31	11
16	9	36	8	33	1½
17	0	37	10	34	1
17	3	39	0½	35	1
17	6	40	2½	36	3
17	9	41	4½	37	3

New Fees Payable by Employers to the Apprenticeship Centre for Students

Years	*s.*	*d.*	*s.*	*d.*
14 to 15	17	9	16	0
15 to 16	21	2	19	2½
Over 16	24	10½	22	2

VISIT TO THE MODEL VILLAGE IN ROUBAIX

MR. ALBERT PROUVOST conducted the members of the mission to the Model Village in Roubaix which has been built for the convenience of operatives from mills in this area.

The scheme is sponsored by the processing firms of the Wool Textile Industry.

The present village was built some years before the war and consists of semi-detached houses of the " villa " type.

It is intended to extend the capacity, but before doing so experiments are being made on a special site of various types of houses and construction to suit the different grades of operatives.

The method adopted is that the employers are responsible for the building of the houses and cost of same and they then deduct an agreed amount from wages in payment of rent.

CONCLUSIONS

SWITZERLAND

THE mission was impressed by the precision in production and excellent finish of the Swiss textile machinery.

Every facility was given to enable us to see the machines in various stages of

production, and meticulous care appears to be given to every detail of construction.

The mechanism is more complicated, requiring greater mechanical knowledge and skill for its maintenance.

Certain developments have taken place since 1939:

Looms: The principal improvement is the complete absence of overhead gear and structure, due to the operation of the healds from the side and under the loom.

Winding Machines: There are no fundamental developments in the automatic winding machines, but many improvements have been effected.

Warping Machinery: High-speed warping is an important development especially in conjunction with the new type of creels.

It remains to be seen whether any disadvantages accrue as a result of removing the overhead gear from above the loom, and placing it at the side and beneath the loom. It would seem, therefore, to be important that when trials are made with these machines they should be made over a wide range of fabrics.

Facilities should be made available to textile processing firms in Great Britain, by means of Import Licences, to enable them to obtain a reasonable amount of machinery for testing purposes.

When the shuttleless weaving machine has passed through its final stages of testing, which tests are to be carried out in actual weaving factories in Switzerland, further enquiries should be instituted in order to ascertain whether or not this machine can be confidently recommended for the weaving of woollen and worsted fabrics. No arrangements have yet been made for bulk production.

The relative value of the Swiss machinery is a factor which must be considered when comparisons are made with any similar machines produced in this country. The impression gained from actual prices quoted was that these were relatively higher than the best machines produced in this country, and capital cost should be compared with relative output and efficiency. Our visits to machinery makers generally have impressed upon us the present high prices being charged for machinery, which serves to emphasise the very great importance of an adequate depreciation allowance for taxation purposes

The textile machinery manufacturers in Great Britain have been precluded from developing new ideas during the last seven years, but the mission has seen sufficient evidence in Switzerland to justify a recommendation that intensive research should be undertaken by our machinery manufacturers at an early date, if they are to make up for the years lost during the war.

The mission was concerned, when visiting the plants of machinery manufacturers, to see machinery being despatched to various countries such as Sweden, Chili, Peru, Argentine, Brazil, South Africa, etc., and none to Great Britain. In addition, the machinery manufacturers of Great Britain are also exporting a large proportion of their production, and the mission views with apprehension the cumulative effect of this policy, and the ultimate repercussions on the Wool Textile Industry of Great Britain.

The Mission was urged by the Swiss machinery manufacturers to bring to the notice of H.M. Government (Import Licensing Department) the necessity for granting Import Licences. Many Swiss firms will not accept orders without the necessary Import Licence, and as delivery is generally two to three years, it means that the Wool Textile Industry of Great Britain cannot avail itself of

the new developments made by the Swiss manufacturers, nor will it be able to do so for many years.

There was little to learn from the three processing factories which we visited, namely dyeing and finishing, woollen manufacturing, and combing and spinning. The mills generally were more spacious, thus affording greater facilities for the wider spacing of machinery. The lay-out of plant was good, but it is no different from the better type of mill in this country.

In some cases, firms have commenced to instal some of the new types of Swiss machinery, and reports on these were that the machines were giving every satisfaction.

Nearly all machines were on individual electric drive, thus removing the necessity for overhead shafting and pulleys; consequently giving a smarter appearance to the factory.

Some factories have installed air conditioning, and those with oil burning power plant stated that this method was cleaner, cheaper, and more efficient than coal fuel. Wool dryers and backwashers did not give off outside heat, which undoubtedly improves working conditions.

FRANCE

WITH the time at our disposal, it was only possible to visit three mills in Roubaix and Tourcoing.

1. The Wool Textile Industry of France is delayed in its recovery by many shortages, principally coal, oil, a variety of raw materials, and labour shortage, especially juveniles.
2. It was not anticipated that many developments could have taken place, due to the occupation by the German Army, and we saw nothing in these factories which was in advance of the methods adopted by processors in Great Britain.
3. The apprenticeship centre was found to be an interesting experiment, and one which could be usefully studied by our own industry.

APPENDIX III

Economies in Weaving Costs due to Longer Runs

AN enquiry has been made into the number of cuts per warp pre-war and at the present day. The number of cuts per warp physically possible varies greatly from say 3 in the case of overcoatings to say 25 for linings. Thus the "average" for any group of firms making different products has no absolute meaning but is only indicative of changes with time. The following averages relate to the same 21 firms and the same types of cloth, and show the greatest average and smallest number of cuts per warp dealt with for a number of cloths.

	CUTS PER WARP		
	Greatest	*Average*	*Least*
Pre-war	8.53	5.05	3.08
1946	9.81	6.46	4.15

The significant changes are that the average number of cuts per warp has increased by 27.9 per cent and that the number of firms accepting orders for single pieces has greatly declined. (In the sample of 21 firms 11 accepted orders for single pieces before the war, and only 4 in 1946).

ECONOMIES OF 'LONG RUNS

NO evidence is available regarding economies in production due to runs longer than the maximum length of a warp. It is not believed they are appreciable.

The costs per cut of weaving warps of different lengths vary according to the number of cuts due to costs which have to be spread over the whole of the warp. These are considered separately below.

(i) *Warping.* The cost per 1,000 ends varies with the number of cuts in any one firm, and varies with different cloths. Examples are shown in pence per cut per 1,000 ends in the following table :—

NUMBER OF CUTS	1	2	3	4	5	10	20	TYPE OF CLOTH
(*a*)	—	43.5	36.5	35.3	—	—	—	Ladies' mantling velour, 13 sk. yarn
(*b*)	13	8.5	7	—	5.8	4.9	—	Fancy & semi-fancy worsteds
(*c*)	—	21	19.5	—	18	16.5	—	Various, both woollen and worsted
(*d*)	—	13.1	12.3	—	11.4	—	—	Worsteds
(*e*)	—	17.5	13.7	—	10.7	8	6.3	2/48s white
(*f*)	—	20.7	16.7	—	13.5	10.5	8	2/28s white
(*g*)	—	32.5	24.5	—	18	12.5	—	2/48s fancy (stripes)
(*h*)	—	38	29	—	21.5	15.5	—	2/30s fancy (stripes)
(*i*)	—	14.5	10.7	—	8.2	5.9	—	Various

(*Note.*—*e*, *f*, *g*, *h*, are all from one Bradford firm, and the cost includes dressing.)

(ii) *Dressing.* This process is largely confined to Bradford type worsteds. Similar figures in pence per cut for two Bradford firms are :—

NUMBER OF CUTS	2	3	5	10	20
(*j*)	26	22	18.7	16.5	15.3
(*k*)	13	10	7.6	5.8	4.9

(iii) *Twisting.* The cost of twisting varies with different cloths. Costs per warp vary from 11d. to 49d. per 1,000 ends irrespective of the number of cuts, and averaged 24.82d. in the examples obtained.

(iv) *Looming.* This cost is also independent of the number of cuts and varies from 15d. to 97d. per 1,000 ends per warp and averaged 54.0d. in the examples obtained.

(v) *Time in changing warp.* This varies according to the number of ends and type of yarn. If no change of weave is concerned it may be between 30 and 210 minutes, while if the weave is also changed the time will be increased to between 60 and 240 minutes. The total costs (i.e. overhead and direct combined) per loom per hour vary according to factors peculiar to each mill but may be between 15.0d. and 37.5d. Consider a cloth with 2,500 ends being produced on a 2-cut and a 5-cut warp.

	COST PER CUT PER 1,000 ENDS	
	2-*Cut Warp*	5-*Cut Warp*
Average cost of warping (examples *b, c, d, i*)	14.28	10.85
Average cost of dressing (examples *j, k*)	19.50	13.18
TOTAL ..	33.78	24.03
Average of warping and dressing (examples *e, f, g, h*) ..	27.19	15.94
Average of two previous lines, i.e., average cost of warping and dressing (based on examples *b, c, d, e, f, g, h, i, j, k*)	30.48	19.98
Cost of twisting (at say 24.82d. per warp)	12.41	4.96
Cost of looming (at say 54.0d. per warp)	27.00	10.80
Average cost of twisting or looming (assuming 50 per cent looming and 50 per cent twisting)	19.71	7.88
Average cost of warping, dressing and twisting or looming per 1,000 ends	50.19	27.88
or for 2,500 ends	125.48	69.70
Estimated overheads for changing warp (say 15d.)	7.5	3.0
Total costs per piece of 2,500 ends	132.98	72.70

Thus the difference in cost per piece between a two-cut and five-cut warp is 60.28d., or approximately 1d. per yard.

This figure is of course very approximate and will vary according to the number of ends and according to the type of cloth.

A similar calculation shows that the difference in cost between five cuts and 10 cuts for those cloths for which a 10-cut warp is possible comes to about ½d. per yard.

APPENDIX IV

Examples of Merchants and Retailers' Margins

(An explanation is given in Chapter IX, page 94 of the Report.)

EXAMPLE 1. Sale from manufacturer to merchant, then to retailer. (Bought in lengths over 45 yards and sold in lengths over 30 yards.) *Non-utility cloth.*

	s.	d.
Manufacturer's price	15	0
Merchant's margin 21.22 per cent on 15s.	3	2.196
	18	2.196
Purchase tax, 33⅓ per cent of 18s. 2.196d.	6	0.716
	24	2.912
Retailer's margin, 42.86 per cent of 24s. 2.912d. ..	10	4.68
Price to customer	34	7.59

EXAMPLE 2. Sale from manufacturer to wholesaler, who sells to retailer a length between 7–30 yards. *Non-utility cloth.*

	s.	d.
Manufacturer's price	15	0
Merchant's margin, 33⅓ per cent on 15s.	5	0
	20	0
Purchase tax, 33⅓ per cent on 20s.	6	8
Price to retailer	26	8
Retailer's margin, 42.86 per cent on 26s. 8d. ..	11	5.15
Price to customer	38	1.15

EXAMPLE 3. Sale from manufacturer to wholesaler, who sells to retailer a length under seven yards. *Non-utility cloth.*

	s.	d.
Manufacturer's price	15	0
Merchant's margin, 50 per cent on 15s.	7	6
	22	6
Purchase tax, 33⅓ per cent on 22s. 6d.	7	6
	30	0
Retailer's margin, 42.86 per cent of 30s.	12	10.30
Price to customer	42	10.30

EXAMPLE 4. Direct sale, manufacturer to retailer. *Non-utility cloth.*

	s.	d.
Manufacturer's price	15	0
Purchase tax, 33⅓ per cent on 15s. plus 16⅔ per cent of 15s.	5	10
Price to retailer	20	10
Retailer's margin, 42.86 per cent of 20s. 10d. ..	9	8.78
Price to customer	30	6.78

EXAMPLE 5. Sale from manufacturer to wholesaler, who sells to retailer a length under seven yards. *Utility cloth.*

	s.	*d.*
Manufacturer's price	15	0
Merchant's margin, 17.65 per cent on 15s.	2	7.77
	17	7.77
Retailer's margin, 33⅓ per cent on 17s. 7.77d. ..	5	10.59
Price to customer	23	6.36

APPENDIX V

Extracts from Proposals with Regard to Statistics for the Wool Industry

as approved by the Wool Textile Delegation

THE Committee suggest as a provisional definition of the Wool Industry that it should be taken to include all processors on wool textile machinery and their suppliers of raw material, whether wool, raw or re-used, hair, or other fibres. Thus the range of the Committee's enquiry extended from the import of wool to the production of the finished cloth; in the case of the home clip, the comparable stage to import has been taken as its delivery to wool merchant or fellmonger.

Within this field the Committee are AGREED that the following types of statistics should be collected and analysed:

1. Employment of labour.
2. Machinery activity.
3. Available supplies.
4. Stocks.
5. Production.
6. Deliveries.
7. Order book positions.

1. EMPLOYMENT OF LABOUR

THE Committee are AGREED that figures of numbers employed, both male and female in the main occupations within the Industry should be collected, and that arrangements be made with the Ministry of Labour to prevent duplication or confusion of classification in their returns; and that similar figures be collected of recruitment and losses of labour.

2. MACHINERY ACTIVITY

THE Committee are AGREED that information be collected to enable the compilation of an Index of Activity for the following machines:

Scouring and carbonising sets.
Combs (all types).
Worsted spindles (all types).
Worsted looms.
Rag pulling and garnetting machines.
Woollen carding machines.
Woollen spindles.
Woollen looms.

3. AVAILABLE SUPPLIES

AVAILABLE supplies of wool should be calculated from the figures of imports less re-exports, shown in broad groups of quality, and be separately classed as :

(i) Greasy,
(ii) Scoured and carbonised, and
(iii) Skin, and slipe,

so that by the use of average clean yields the total available supplies could be reduced to a clean basis. To these imported supplies should be added the amount of wool produced by fellmongers from imported skins, and the retained home production of fleece (washed and unwashed) and skin wool.

Available supplies of various types of hair should be calculated on a similar basis.

The Committee are AGREED that the person responsible for making the return of such statistics should be the importer, the merchant of British wools, and the fellmonger respectively.

Supplies of re-used wool from rags should be covered by returns from rag merchants and shoddy manufacturers.

4. STOCKS

THE Committee are AGREED that the commencing stock should be based on the census now being undertaken by Wool Control, to which it is hoped to obtain access.

The Committee are further AGREED that in order to complete the picture of the supply position, an annual stock return of raw wool, tops, and noils at (30 June) should be made. Such a figure should be of material value in checking price fluctuation.

5. PRODUCTION

ON the worsted side the Committee are AGREED that the production of top and noil, yarn, and finished cloth are the figures that are required ; and on the woollen side, the production of woollen yarn and cloth. Cloth will be classed by type and square yards/weight, so as to be suitable for relation to both market research and machinery activity.

6. DELIVERIES

THE Committee are AGREED that deliveries should be obtained as far as possible under headings comparable with those of production, so that a consideration of the two sets of figures would make possible a monthly estimate of the change in stock levels.

7. ORDER BOOK POSITION

ALTHOUGH they realise that it is something of an innovation for an industry in this country to disclose such information, and that there are technical difficulties in arriving at a satisfactory Index of Demand, the Committee are, nevertheless, AGREED that the Industry would derive the greatest benefit from knowing the general Sales Order Book position, both home and export, in terms of the number of weeks' work in hand, where practicable, in the various sections of the industry.

The Committee are further AGREED that all these figures, with the exception of stock returns, should be collected for each calendar month, and that the unit of measurement should be one of number or quantity, not of value.

APPENDIX VI

Cost Analyses

TABLES 44–50 were supplied by the Ministry of Supply Costing Department and are subject to the qualifications listed in Chapter VII. They refer to Government contracts in war-time conditions, and are not necessarily representative of costs in a normal year.

Tables 51–53 were supplied by the Woollen and Worsted Trades Federation, and Table 54 by the Worsted Spinners' Federation. While Table 51 refers to conversion costs for various cloths at June 1942, Tables 52 and 53 are based on current prices and activity. In Table 54 the maximum conversion costs at which a spinner could work economically in 1938, are compared with the production costs of a number of representative businesses as agreed with the Board of Trade for the purpose of fixing maximum prices. The 1938 costs were approved by a committee of spinners as representative of the costs of highly efficient plants at full activity; the 1946 costs are based on average costs in 1940, adjusted to take account of increases in wages, consumables, etc.

TABLE 43

AVERAGE VALUE OF RAW MATERIAL, AND INTERMEDIATE AND FINISHED PRODUCTS IN 1937

	Pence per lb.
Average value of clean virgin wool bought for combing	23.5
Average value of tops sold	29.0
Average value of worsted yarns (all raw wool)[1]	41.4
Average value of worsted tissues (all raw wool)[1]	72.0
Average value of clean virgin wool for woollen spinning	17.5
Average value of woollen yarns (all raw wool)[1]	23.0
Average value of woollen tissues (all raw wool)	49.1

[1] Excluding yarns of hair and reprocessed wool.

Source : Census of Production

TABLE 44

ANALYSIS OF TOTAL COST OF WORSTED CLOTH

	Cloth A 15/16 ozs. Per cent	Cloth B 22 ozs. Per cent	Cloth C 20 ozs. Per cent
Material	39	42	41
Wool combing and sorting	12	13	12
Worsted spinning	16	25[1]	26[1]
Weaving, burling, mending and packing	22	14	16
Commission dyeing and/or finishing	11[2]	6[3]	5[3]
	100	100	100
Material, including dyeware, etc.	41	42	41
Labour	24.5	24	26
Overhead	34.5	34	33
	100	100	100
Wages	41.5	41	44
Overheads	58.5	59	56
	100	100	100

[1] Includes slubbing and dyeing. [2] Dyeing and finishing. [3] Finishing only.

Source : Ministry of Supply (Costing Department)

TABLE 45

ANALYSIS OF TOTAL COST OF WEAVING WORSTED CLOTH

	Cloth A 17 oz. 50 Picks Per cent	Cloth B 20 oz. 66 Picks Per cent	Cloth C 8½ oz. 42 Picks Per cent
Material (worsted yarn)	79.75	79.08	69.95
Wages:			
Twisting and looming Weaving Burling and mending	5.35	5.65	7.23
Overheads	8.71	9.50	13.13
Finishing (commission)	5.19	4.92	8.28
Making up and packing	1.00	0.85	1.41
	100.00	100.00	100.00

Source : Ministry of Supply (Costing Department)

TABLE 46

ANALYSIS OF TOTAL COST OF WOOLLEN PRODUCTS

	Cloth A 16/17 ozs. 37 Picks	Cloth B 30 ozs. 36 Picks	Cloth C 21 ozs. 34 Picks		Blanket 4 lb. 60×87
	Per cent	Per cent	Per cent		Per cent
Material	60.0	60.0	57.5	Material	72.0
Wool dyeing:					
Dyewares	1.75	2.0	1.25		
Conversion	4.25	4.0	2.75		
Spinning	10.0	11.5	12.5	Spinning	10.6
Weaving	16.0	15.5	19.0	Weaving	10.0
				Scouring and milling	3.4
Finishing	8.0	7.0	7.0	Finishing	4.0
	100.0	100.0	100.0		100.0
Material (including dyewares)	61.75	62.0	58.75		
Labour	21.25	20.0	22.75		
Overhead	17.0	18.0	18.5		
	100.0	100.0	100.0		
Wages[1]	55.5	53.0	55.0		
Overhead[1]	44.5	47.0	45.0		
	100.0	100.0	100.0		

[1] The general average of the trade is wages 55 per cent; overheads 45 per cent.

Source : Ministry of Supply (Costing Department)

TABLE 47

ANALYSIS OF RETAIL SELLING PRICE OF A WORSTED UTILITY SUIT

	Per cent	
Raw material (wool)	10.1	
Wool combing and sorting	3.1	
Worsted spinning	4.2	
Weaving	5.8	
Dyeing and finishing	2.8	
		26.0
Trimming, etc.	9.7	
Making up	36.8	
Retailer's margin	27.5	74.0
		100.0

Source : Ministry of Supply (Costing Department)

TABLE 48

ANALYSIS OF THE FINAL COST OF A DEMOBILISATION CIVILIAN SUIT

	Per cent	
Raw material, wool	14.9	
Combing and sorting	4.6	
Spinning	6.1	
Weaving	7.4	
Dyeing and finishing	4.2	
		37.2
Trimmings, linings, etc.	13.3	
Making up, including profit	49.5	62.8
		100.0

Source : Ministry of Supply (Costing Department).

TABLE 49

ANALYSIS OF RETAIL SELLING PRICE OF NATIONAL PRICE CONTROLLED BLANKET

	Per cent
Raw material	38.6
Manufacturers' costs	20.8
Manufacturers' profits	2.6
Wholesalers' margin	13.0
Retailers' margin	25.0
	100.0

Source : Ministry of Supply (Costing Department)

TABLE 50

ANALYSIS OF SELLING PRICE OF MEN'S HALF HOSE

	Per cent
Raw material (wool)	19.5
Combing and sorting	6.2
Worsted spinning	8.1
Knitting and making-up	21.5
Dyeing and finishing	6.7
Packing	0.5
Wholesaler's margin	12.5
Retailer's margin	25.0
	100.0

Source : Ministry of Supply (Costing Department)

TABLE 51

MAKE-UP OF CONVERSION COSTS IN WOOLLEN AND WORSTED MANUFACTURING, JUNE 1942

	Woollen Manufacturing	Worsted Manufacturing (excluding finishing)
Salaries	8.2	13.5
Wages	57.5	53.8
Room, power and fuel	11.3	8.4
Repairs	4.2	3.2
Consumables	9.8	1.3
Health, etc., insurance	1.7	2.0
Sundry stores	0.5	1.4
Carriage	2.1	2.9
Fire insurance	0.5	0.4
Sundries	1.6	3.7
Bank charges	0.2	0.5
Audit	0.3	0.4
Commission and travelling	2.1	8.5
	100.0	100.0

Source : Woollen and Worsted Trades' Federation

TABLE 52

COST OF WOOLLEN CLOTHS, 1946

	Per cent
(*a*)	
Material (wool, shoddy, etc.) } Wool dyeing	57.9
Spinning	16.1
Weaving	16.8
Finishing	9.2
	100.0
(*b*)	
Material	56.1
Wages	25.4
Overhead	18.5
	100.0
(*c*)	
Wages	58.2
Overhead	41.8
	100.0

Source : Woollen and Worsted Trades' Federation

TABLE 53

COST OF WORSTED CLOTHS, 1946[1]

	Per cent
Raw material (yarn)	67.0
Wages (twisting, looming, weaving, burling and mending)	9.6
Overheads	17.5
Finishing	5.0
Making-up and packing	0.9
	100.0

[1] The relation between wages and overheads varies greatly between fine worsted manufacturers and Bradford type worsted manufacturers. The figures given above are between the two extremes.

Source : Woollen and Worsted Trades' Federation

TABLE 54

	1938 Minimum Production Costs d. per lb.	1946 Average of Representative Production Costs d. per lb.	*Increase* Per cent
2/24 white botany yarn on cheese :			
Wages	3.31	6.72	103
Consumables and overheads	2.71	5.52	113
Carriage		0.25	
	6.02	12.49	
	Wages 55 per cent	Wages 54 per cent	
2/32 white botany yarn on cheese :			
Wages	4.43	8.20	85
Consumables and overheads	3.63	6.95	98
Carriage		0.25	
	8.06	15.40	91
	Wages 55 per cent	Wages 53 per cent	
2/48 white botany yrarn on cheese :			
Wages	6.98	12.14	74
Consumables and overheads	5.72	9.70	74
Carriage		0.25	
	12.70	22.09	74
	Wages 55 per cent	Wages 55 per cent	

Source : Worsted Spinners' Federation Ltd.

TABLE 55

WORSTED SPINNING SPINDLES, FEBRUARY 1945

Number of spindles per mill	Under 2,000		2,000–5,000		5,000–10,000		10,000–20,000		20,000–50,000		TOTAL	
	Mills	Spindles	Mills	Spindles	Mills	Spindles	Mills	Spindles	Mills	Spindles	Mills	Spindles
Worsted spinning only	13	16,858	54	194,216	78	559,418	40	550,346	13	394,334	198	1,715,172
Combers and worsted spinners ..	—	—	2	7,610	3	19,096	11	176,782	13	440,034	29	643,522
Combers, worsted spinners and manufacturers	—	—	—	—	—	—	4	56,016	3*	165,718	7	221,734
Worsted spinners and manufacturers	2	2,904	11	42,168	5	38,000	14	191,584	5	118,753	37	393,409
Worsted and woollen spinners ..	2	3,368	1	3,952	—	—	2	24,364	—	—	5	31,684
Combers and worsted and woollen spinners	—	—	2	6,540	—	—	1	17,878	1	31,644	4	56,062
Worsted and woollen spinners and manufacturers	4	5,072	3	12,286	3	21,404	—	—	—	—	10	38,762
Combers, worsted and woollen spinners and manufacturers	—	—	2	6,776	—	—	1	12,736	—	—	3	19,512
	21	28,202	75	273,548	89	637,918	73	1,029,706	35	1,150,483	293	3,119,857

" Combers " refers to first combing only. Firms having only recombing (i.e. colour spinners) are classed as spinners and not as combers.

In the case of firms with branches in two or more districts, each branch is counted as a separate concern for the purpose of this summary. If a firm has two or more mills in the same district, it is reckoned as one unit or " mill."

* Including one mill with more than 50,000 spindles.

Source : Worsted Spinners' Federation

TABLE 56. EXPORT OF WOOL TISSUES FROM THE U.K.
(*Million lbs.*)

Exported to	1928		1937	
	Quantity	Percentage	Quantity	Percentage
Canada	17.5	18	10.1	15
China, Japan and Hong Kong ..	17.9	18	2.5	4
U.S.A.	7.4	8	4.6	7
Argentina	6.2	6	5.8	8
Australia	4.2	4	1.0	1
Germany	4.2	4	1.8	3
Eire	3.7	4	3.3	5
Union of S. Africa	3.5	4	5.5	8
India and Burma ..	3.4	4	2.9	4
Netherlands ..	2.5	3	2.2	3
Belgium	2.3	2	0.8	1
France	1.8	2	1.3	2
New Zealand ..	1.8	2	3.6	5
Italy	1.4	1	0.3	—
Greece	1.4	1	2.0	3
Egypt	1.2	1	0.5	1
Colombia	1.1	1	1.0	1
Brazil	1.1	1	0.1	—
Denmark	1.1	1	3.9	6
SUB-TOTAL ..	83.7	86	53.2	77
GRAND TOTAL ..	97.1	100	68.8	100

Source : " *World Consumption of Wool* 1938," *Imperial Economic Committee*

TABLE 57. IMPORTS OF WOOL TISSUES[1] INTO CERTAIN COUNTRIES
(*Million lbs.*)

	1928		1937
U.K.	23.6		3.2
China and Manchuria	22.7		8.8
Argentina	11.8		8.4
Canada	—[2]		10.6
Netherlands	10.2		6.2
U.S.A.	9.8		5.5
Norway and Sweden	5.3		7.8
Denmark	5.2		5.7
TOTAL (excluding Canada)	88.6	TOTAL	56.2

Source : " *World Consumption of Wool*, 1938," *Imperial Economic Committee*

[1] In general, excluding blankets, carpets, furniture stuffs, felts and pile fabrics.
[2] Not available.

TABLE 58. EXPORTS OF WOOL TISSUES[1] FROM CERTAIN COUNTRIES
(*Million lbs.*)

	1928	1937
U.K.	97.1	68.8
France	46.9	4.7
Germany	35.3	18.4
Czechoslovakia	23.7	5.4
Italy	21.7	24.1
Belgium	4.7	2.6
Netherlands	3.8	0.6
Poland	2.0	4.8
Japan[2]	0.9	19.3
TOTAL ..	236.1	148.7

Source : " *World Consumption of Wool*, 1938," *Imperial Economic Committee*

[1] In general, excluding blankets, carpets, furniture stuffs, felts and pile fabrics.
[2] Estimates calculated on assumption that 1 kilogramme of cloth was equivalent to 6 sq. yds. in 1928, and to 4 sq. yds. in 1937.

TABLE 59

WOOL CLOTH FOR CLOTHING—MAY 1943–APRIL 1944. (000 linear yards)

Description	Specification Nos.	Type of Garments	Deliveries to Home Market	Consumption by Large Clothing Manufacturers[1]						
				Men	Youths	Boys	Women	Girls	Infants	TOTAL
UTILITY										
Low melton	200, 207, 211.	Overcoats	1,406.6	693.4	218.5	462.7	1.3	27.0	37.6	1,440.5
Low woollen tweed ..	203, 204, 205.	Men's and boys' suits, infants' overcoats.	3,781.7	1,186.9	574.1	1,546.8	8.8	8.0	29.9	3,354.5
Derby tweed	224.	Men's suits and trousers.	932.4	764.9	9.2	1.1	0.1	—	—	775.3
Gym. serge	218.	Girls' gym. tunics ..	730.9	—	—	0.1	—	649.7	1.0	650.8
Overcoating	212, 221.	Overcoats	4,683.4	1,305.9	80.3	70.4	1,365.9	220.4	43.5	3,086.4
Worsted flannel ..	214, 228.	Men's and youths' suits, women's costumes.	2,388.8	1,569.4	224.1	1.9	269.3	3.2	1.7	2,069.6
Flannel	201, 213.	Men's and boys' suits and trousers.	3,632.7	1,106.5	741.6	1,402.1	2.1	3.4	7.5	3,263.2
Baby flannel	225.	Baby wear	513.9	—	—	—	—	18.4	461.3	479.7
Blazer cloth	229, 230.	Blazers	1,150.2	8.1	48.7	485.3	15.4	351.1	49.9	958.5
Shirting	216, 226.	Shirts	3,687.4[2]	2,067.2[2]	1.1[2]	667.8[2]	0.1[2]	—	2.8[2]	2,738.0[2]
Gabardine	215, 223.	Raincoats	3,499.8	823.8	296.0	1,149.2	352.1	593.5	6.5	3,221.1
Woollen tweed, other woollen cloth, all-worsted cloth other than flannel, Scottish cloth.	206, 208, 209, 222, 217, 220, 227.	Men's and boys' suits and overcoating. Women's and girls' overcoats, costumes, skirts, infants' overcoats and suits.	33,069.4	8,410.9	1,488.5	2,815.9	10,424.4	2,586.3	2,501.6	28,227.6
Dress cloth and lightweight suiting; woollen tweed and other woollen cloth; all-worsted cloth other than flannel (lighter weight).	210, 235, 219, 236.	Women's, girls' and infants' dresses, skirts, costumes and coats; boys' knickers	15,737.4	—	—	18.3	5,311.1	1,458.6	1,059.4	7,847.4
TOTAL UTILITY			75,214.6	17,937.0	3,682.1	8,621.6	17,750.6	5,919.6	4,202.7	58,114.6
NON-UTILITY			34,971.0							
TOTAL—UTILITY AND NON-UTILITY ..			110,185.6							

[1] The clothing census from which these figures are taken covered only the larger clothing manufacturers responsible for about 80 per cent of total production.

[2] Expressed as 54 in. width.

Source : Board of Trade

TABLE 60. PRODUCTION OF WOOLLEN AND WORSTED WOVEN FABRICS, BY TYPE IN THE UNITED STATES

	1939 Quarterly Average		1946 First Quarter			
	Million Linear Yards	Per Cent	Million Linear Yards	Per Cent	Proportion of Worsted	Proportion of Woollen
Suiting and panting ..	37.5	40	42.8	30	65	35
Shirting	0.5	1	4.1	3	8	92
Overcoating and topcoating	6.8	7	5.1	4	10	90
Men's wear TOTAL ..	44.7	48	51.9	37	55	45
Women's and children's wear TOTAL ..	26.8	29	55.0	39	20	80
General use fabric.[1] All other apparel fabric ..	8.8	9	12.9 2.1	9 1	25 80	75 20
Apparel fabrics TOTAL ..	80.3	86	121.9	86	37	63
Blankets	4.9	5	12.8	9	—	—
Upholstery, etc.	7.8	9	7.4	5	—	—
Non-apparel fabric TOTAL ..	12.7	14	20.2	14	—	—
GRAND TOTAL ..	93.0	100	142.1	100	—	—

[1] Including melton, mackinaw, snow and ski suit cloth, lining and inter-lining and bathrobe flannel.

Source : Facts for Industry Wool Manufacturers. (U.S.A. Department of Commerce)

TABLE 61. WOOL: WHOLESALE PRICE INDEX

Annual Averages.

1924 = 100

	YARNS				
	Worsted Weaving	Hosiery	Skeins	Serges	Raw Wool 1914 = 100
1924	100	100	100	100	198
1925	84.9	90.1	104.3	87.2	162
1926	75.8	75.6	95.3	78.5	133
1927	75.4	76.5	90.0	79.8	140
1928	79.0	85.5	95.0	80.7	153
1929	65.2	77.0	88.3	68.8	116
1930	50.0	56.1	78.7	56.3	75
1931	43.4	44.8	67.7	46.8	57
1932	41.7	40.4	48.8	45.9	56
1933	47.4	42.4	48.2	50.1	70
1934	51.3	46.7	54.6	53.3	79
1935	47.5	44.7	48.8	51.6	72
1936	53.1	53.3	56.7	57.4	91
1937	57.6	72.9	71.9	59.7	113
1938	46.5	55.5	73.3	53.1	80
1939	45.2	62.6	73.6	55.8	83
1940	77.4	101.6	106.0	69.4	128
1941	80.5	110.6	114.4	71.9	137
1942	82.5	112.6	115.3	72.9	137
1943	85.4	115.5	116.9	83.2	137
1944	90.1	120.7	119.5	100.5	137
1945	90.6	121.1	120.6	94.5[1]	133
1946	93.8	124.7	125.0	91.7[1]	139

[1] After deduction of subsidy. *Source : Board of Trade and Weekly Wool Chart*

TABLE 62

EMPLOYMENT IN WOOL TEXTILE INDUSTRY, SEPTEMBER 1946

	Males							Females						
	Juveniles[1]	Others under 18½	18½ and under 31	31 and under 41	41 and over	Part-time All Ages	Total	Juveniles[1]	Others under 18	18 and under 31	31 and under 41	41 and over	Part-time All Ages	Total
1. *Direct Production :*														
Wool warehouse and sorting ..	39	230	933	1,389	3,822	45	6,458	1	28	87	62	174	42	394
Wool carbonising and scouring ..	5	49	167	245	733	—	1,199	—	2	16	13	32	—	63
Wool combing	17	225	832	1,312	3,393	2	5,781	44	287	709	485	1,296	43	2,864
Machine blending	—	11	38	69	132	—	250	2	16	20	15	32	—	85
Worsted spinning[2]	497	1,385	1,541	1,615	3,408	11	8,457	680	3,524	7,118	3,736	6,057	1,305	22,420
Winding, reeling and warping ..	77	207	358	528	1,251	4	2,425	411	1,552	3,412	1,897	2,940	788	11,000
Rag pulling and woollen spinning	176	701	2,012	2,856	8,921	9	14,675	100	540	1,368	722	1,627	135	4,492
Manufacturing[3]	191	702	1,885	2,670	6,680	18	12,146	745	3,394	8,777	5,624	13,380	1,924	33,844
Dyeing (productive workers) ..	6	63	287	454	1,280	—	2,090	3	10	13	7	17	2	52
Finishing[4]	96	349	1,184	1,788	5,357	22	8,796	57	196	528	291	536	100	1,708
Fellmongering	4	70	216	381	1 660	3	1,334	—	4	32	9	13	1	59
Miscellaneous	1	5	7	13	41	—	67	3	20	47	27	62	8	167
Total	1,109	3,997	9,460	13,320	35,678	114	63,678	2,046	9,573	22,127	12,888	26,166	4,348	77,148
2. *Administrative, Clerical, etc. :*														
Directors, managers, salesman, designers, cashier, etc.	3	14	463	1,556	4,895	113	7,044	4	3	55	85	171	20	338
Clerical staff	74	229	669	796	1,131	25	2,924	149	790	1,810	489	592	175	4,005
Power house, transport, mill repairs and maintenance ..	35	194	635	1,263	5,033	20	7,180	15	5	20	14	41	19	114
Watchmen, firewatchers, canteen, etc.	9	20	93	174	1,255	50	1,601	7	59	317	325	922	707	2,337
Total	121	457	1,860	3,789	12,314	208	18,749	175	857	2,202	913	1,726	921	6,794

[1] Workers who have left school less than 9 months ago.
[2] Tops and roving warehouse, yarn warehouse and despatch ; all operations up to and including folding.
[3] Weaving, twisting-in, healding, burling and mending.
[4] All finishing processes, pattern room, piece warehouse.

Source : Wool Control

TABLE 63

EAST AND WEST RIDING REGION

Table showing the Reasons advanced by Unemployed Women for not desiring to return to, or take up Employment in the Woollen and Worsted Textile Industry. June 1946

		TEXTILE AREAS						NON-TEXTILE AREAS					
		Married		Single		Total		Married		Single		Total	
		Experienced	Inexperienced	Experienced	Inexperienced	Experienced	Inexperienced	Experienced	Inexperienced	Experienced	Inexperienced	Experienced	Inexperienced
Number of apparently suitable women interviewed	1	247	73	154	38	401	111	49	520	16	710	65	1,230
Number included in (1) who accepted employment in Wool Textiles	2	75	14	57	11	132	25	10	82	7	75	17	157
Number included in (1) who refused to consider employment in Wool Textiles	3	172	59	97	27	269	86	39	438	9	635	48	1,073
Analysis of Reasons advanced for refusing Employment at (3):	4												
Rates of wages unsatisfactory	*a*	19	10	4	4	23	14	4	13	2	9	6	22
Working conditions in mills unsatisfactory	*b*	21	10	20	11	41	21	4	6	1	—	5	6
Shorter hours of work required	*c*	24	7	1	—	25	7	4	16	1	5	5	21
Part-time work only required	*d*	29	10	3	—	32	10	—	5	—	—	—	5
Shift work (6 a.m. to 2 p.m.; 2 p.m. to 10 p.m. required	*e*	1	—	—	—	1	—	—	—	—	—	—	—
Five-day working week required	*f*	2	—	—	—	2	—	—	—	—	—	—	—
Objection to early morning start	*g*	9	3	—	—	9	3	4	8	1	8	5	16
Objection to working away from home	*h*	—	—	—	—	—	—	12	301	4	531	16	832
Health grounds	*i*	50	5	38	2	88	7	—	4	—	9	—	13
Work too heavy	*k*	1	—	—	—	1	—	—	—	—	—	—	—
Work too noisy	*l*	1	—	—	—	1	—	—	—	—	—	—	—
Does not like mill work	*m*	5	10	28	1	33	11	4	1	—	67	4	68
Wants to join W.L.A.	*n*	—	—	—	1	—	1	—	—	—	—	—	—
Wants outdoor work	*o*	2	—	—	—	2	—	—	—	—	—	—	—
Wants office work	*p*	7	2	1	2	8	4	—	—	—	—	—	—
Afraid of machinery	*r*	—	1	—	4	—	5	—	—	—	—	—	—
Prefers engineering work	*s*	1	—	—	1	1	1	—	—	—	—	—	—
Wants nursing	*t*	—	—	1	—	1	—	—	—	—	—	—	—
Not enough prospects	*u*	—	—	1	1	1	1	—	—	—	6	—	6
Poor canteen facilities	*v*	—	—	—	—	—	—	5	—	—	—	5	—
No morning or afternoon break	*w*	—	1	—	—	—	1	2	—	—	—	2	—
Too old	*x*	—	—	—	—	—	—	—	84	—	—	—	84

Source : Ministry of Labour

TABLE 64

WOOLLEN AND WORSTED INDUSTRY

Age Analysis of Insured Persons 1939 and 1945.
(Great Britain)

MEN

AGE	1939		1945	
	Number	Percentage	Number	Percentage
14–15	5,020	5.28	2,660	5.28
16–17	5,410	5.67	2,710	5.40
18–20	7,150	7.49	880	1.74
21–25	10,977	11.50	1,520	3.02
26–30	11,678	12.23	1,300	2.58
31–35	11,210	11.75	2,330	4.63
36–40	9,108	9.54	4,670	9.27
41–45	8,875	9.30	7,880	15.64
46–50	8,096	8.48	7,460	14.81
51–55	6,695	7.01	7,720	15.32
56–60	6,306	6.61	7,460	14.81
61–64	4,905	5.14	3,780	7.50
TOTAL	95,430	100.00	50,370	100.00

WOMEN

AGE	1939			1945		
	Married and Widowed	Others	Total	Married and Widowed	Others	Total
14–15	—	8,310	8,310	—	5,230	5,230
16–17	—	11,810	11,810	—	6,980	6,980
18–20	847	14,273	15,120	1,080	8,300	9,380
21–25	4,450	14,814	19,264	3,390	3,440	6,830
26–30	7,519	8,582	16,101	3,230	1,520	4,750
31–35	8,919	6,895	15,814	4,300	3,080	7,380
36–40	8,712	5,760	14,472	5,260	3,340	8,600
41–45	6,089	5,124	11,213	5,010	4,250	9,260
46–50	4,309	3,358	7,667	4,100	4,250	8,350
51–55	2,823	2,544	5,367	3,130	3,190	6,320
56–60	1,799	1,843	3,642	1,370	1,920	3,290
61–64	1,132	1,168	2,300	—	—	—
TOTAL ..	46,599	84,481	131,080	30,870	45,500	76,370

The analysis of persons over 20 is based on a sample. No sample was taken in 1939, but the figures given are in the same proportions as those obtained from a sample made in 1937.

Between 1939 and 1945, women over 60 ceased to be insurable. During the same period, non-manual workers with salaries between £250 and £420 a year were brought into insurance. These two changes slightly affect the comparability of the figures.

Source : Ministry of Labour

TABLE 65

PRINCIPAL WOOL TEXTILE MACHINERY MANUFACTURERS

Wool Scouring and Carbonising	
Taylor Wordsworth & Co. Ltd.	Leeds
Petrie & McNaught, Ltd.	Rochdale
Hughes & Lancaster	Wrexham
Woollen and Worsted Carding	
Platt Bros. & Co. Ltd.	Oldham
John Haigh & Sons, Ltd.	Huddersfield
Wm. Tathams, Ltd.	Rochdale
Chadwick Machine Co. Ltd.	Cleckheaton
Worsted Combing	
Taylor Wordsworth & Co. Ltd.	Leeds
Prince-Smith & Stells, Ltd.	Keighley
Worsted Drawing, Spinning and Twisting	
Prince-Smith & Stells, Ltd.	Keighley
Platt Bros. & Co. Ltd.	Oldham
Asa Lees & Co. Ltd.	Oldham
J. & T. Boyd	Glasgow
Woollen Spinning	
Asa Lees & Co. (Mule)	Oldham
Wm. Whiteley & Sons, Ltd. (Mule)	Huddersfield
Platt Bros. & Co. (Ring)	Oldham
Winding and Warping	
Thos. Holt, Ltd.	Rochdale
George Hattersley & Sons, Ltd.	Keighley
Muschamp Taylor, Ltd.	Manchester
Dixon Hawkesworth, Ltd.	Middleton
Weston Engineering Co.	Nr. Colne, Lancs.
Knowles & Co.	Bradford
Weaving	
George Hattersley & Sons, Ltd.	Keighley
British Northrop Loom Co. Ltd.	Blackburn
Hutchinson & Hollingworth	Dobcross, Nr. Oldham
Dyeing and Finishing	
Wm. Whiteley & Sons, Ltd.	Huddersfield
James Bailey	Slaithwaite
Longclose Engineering Co. Ltd.	Leeds
Sellers & Co.	Huddersfield
E. Gordon Whiteley	Leeds
John Dalglish & Sons	Glasgow
John Mitchell & Sons, Ltd.	Huddersfield
Samuel Pegg & Son	Leicester
Spooner Dryer & Engineering Co.	Ilkley
Tomlinson (Rochdale) Ltd.	Rochdale

TABLE 66

EQUIPMENT OF WOOLLEN AND WORSTED FACTORIES IN U.K.

	1870	1878	1904	1918	1938	1943
Carding sets	13,430	—	6,700	6,145	4,540	4,606
Rag pulling machines	—	—	—	1,289	879	956
Combs	1,267	—	2,924	2,952	2,577	2,616
Worsted spindles :						
(000's) Mule ..	—	—	—	283	300	438
Cap ..	—	—	—	1,769	1,978	2,004
Ring ..	—	—	—	176	244	243
Flyer ..	—	—	—	1,238	688	626
TOTAL ..	1,821	2,097	2,938	3,466	3,210	3,311
Woollen spindles :						
(000's) Mule ..	—	—	—	2,958	2,238	2,235
Frame ..	—	—	—	35	45	74
TOTAL ..	2,665	3,421	2,688	2,993	2,283	2,309
Doubling spindles :						
(000's)	472	784	1,059	1,337	1,469	1,423
TOTAL spindles (000's)	4,958	6,302	6,685	7,796	6,962	7,043
Power looms (000's)	115.5	146.4	104.5	114.6	77.6	78.8

Notes

1. The figures for 1870, 1878, 1904 and 1918 refer to the United Kingdom and are from the Survey of the Textile Industries, 1928, page 273. The figures of spindles in 1918 refer to Great Britain only and are from the Bradford Chamber of Commerce's " Statistics relating to the Worsted, Woollen and Artificial Silk Trades," 1940, p. 110. The figures for 1938 are from a Board of Trade Census and those for 1943 from a Census conducted by the Wool Control; both sets of figures relate to Great Britain, including Northern Ireland.

2. Some of the figures for 1938 are not comparable with those for other years; the number of combs is an estimate on the assumption that machines used solely for re-combing or for combing silk and artificial silk were equal in number in 1938 and 1943.

3. There is an obvious (and unexplained) discrepancy between the figures for mule spindles in worsted spinning in 1938 and 1943. The figure for 1943 is the more reliable.

4. A partial census of looms in 1928 by Mr. G. H. Wood gave a total of 106,200 for Great Britain. The results are given in the Bradford Chamber of Commerce's " Statistics," page 110.

5. The division of worsted spindles into cap, ring and flyer, is an estimate based on later returns.

Source : Wool Control

TABLE 67

EQUIPMENT OF WOOLLEN AND WORSTED FACTORIES IN THE U.K.

(November 1943)

	Total	Yorkshire and Lancashire	Midlands	West of England	Rest of England	Scotland	Wales	Northern Ireland
Carbonising sets	118	94	1	15	—	8	—	—
Scouring sets	1,474	1,132	17	109	—	183	22	11
Rag pulling machines	956	922	28	2	—	3	—	1
Waste pulling machines	144	127	7	3	—	5	2	—
Garnetting machines	464	350	62	13	—	36	1	2
Milling machines	3,372	2,769	—	255	—	286	33	29
Milling stocks	453	356	6	28	—	53	6	4
Woollen carding engines[1]	4,606	3,555	128	252	—	570	58	43
Combs, Merino :								
(*a*) French	615	615	—	—	—	—	—	—
(*b*) Noble, Holden, Lister	1,036	1,003	—	14	—	19	—	—
Crossbred carding	584	478	67	6	—	33	—	—
Crossbred preparing	216	194	—	22	—	—	—	—
Other wool or hair	165	165	—	—	—	—	—	—
Silk	68	68	—	—	—	—	—	—
Used solely for recombing	488	478	6	3	—	1	—	—
TOTAL	3,172	3,001	73	45	—	53	—	—
Spindles :								
Worsted frame	2,873,172	2,658,466	125,710	17,066	—	71,930	—	—
Worsted mule	438,258	400,058	38,200	—	—	—	—	—
Woollen frame	74,245	42,158	22,256	299	—	8,722	—	810
Woollen mule	2,234,850	1,732,958	21,158	131,464	—	311,415	18,630	19,225
Doubling	1,422,913	1,302,460	34,750	14,428	—	67,260	825	3,190
TOTAL	7,043,438	6,136,100	242,074	163,257	—	459,327	19,455	23,225
Looms :								
54 in. and upwds	61,171	54,175	277	2,070	64	4,171	172	242
Below 54 in.	11,822	7,948	1,096	141	39	2,385	189	24
Not used for wool fibres	5,809	5,105	69	13	48	573	1	—
TOTAL	78,802	67,228	1,462	2,224	151	7,129	362	266

[1] Does not include carding engines with no spinning to follow.

Source : Wool Control

APPENDIX VIII

Processes of Manufacture in the Wool Textile Industry

1. WOOLCOMBING SORTING AND BLENDING

RAW wool is received by the Woolcomber, usually in bales and in the state in which it was packed in the country of origin. It is sorted by hand into various qualities represented by length and fineness of fibre and is made up into blends, and in this state it passes to the first of the machine processes.

WASHING. This consists of a series of tanks, usually four in number, containing the scouring liquors through which the wool is slowly propelled by the aid of mechanically driven forks. The scouring agents normally employed are soap and sodium carbonate, and the strength of the agents and temperature of the suds are suitably adjusted. The whole of this process is designed to give a minimum of agitation which would tend to cause felting and consequent damage to the fibres. Drying is effected by hot air which is blown through the material during its passage through the drying machine, from which it emerges in a clean and open state free from the original dirt and grease.

CARDING. The object of the carding process is to open up the wool and make the fibres parallel to some extent. The carding machine is equipped with many rollers of various sizes working in close conjunction one with the other and driven at suitable speeds. Their surfaces are covered with fine wire teeth which engage the wool and gradually reduce it to a fine film, which is delivered as a continuous sliver. During this process steel bladed rollers operating at high speed in close proximity to certain of the card rollers remove impurities which are too large to enter the interstices of the card teeth.

Long Crossbred wools are frequently not carded but subjected to a process known as "preparing," which consists of four operations of gilling on strongly constructed gill boxes. This process opens up the fibre and effects the necessary parallelisation.

BACKWASHING AND GILLING. Following both carding and preparing comes the "backwashing" operation, in which the slivers are passed through two or three short bowls containing mild detergents which cleanse them from the finely divided foreign matter still remaining in the wool after the carding process. Drying is carried out by hot air blown through perforated cylinders around which the wool is conveyed. Immediately on leaving the drying chamber an appropriate amount of oil is added to assist fibre control in subsequent operations. The wool then passes directly into a gill box where it is subjected to a combing action by a series of straight combs. Two further gill boxes of similar construction follow, although the pinning is successively finer. These gilling operations are designed to effect a thorough blending of long and short fibres and to cause the greatest possible straightening of the fibres, before they are subjected to the action of the more finely set comb pins. There follows a short operation in which a machine, called a punch or ball winder, winds four separate ends or slivers in parallel formation and builds them under compression into a com-

pact flat sided ball. Each ball thus has four ends of equal length and is so built that subsequent unwinding presents no difficulty. Eighteen of these balls are required for a Noble comb set.

COMBING. In the Noble combing process the principal agents consist of one large and two small circular combs, which are heated to assist the working of the wool and suitably pinned according to the quality being processed. These are caused to revolve in a clockwise direction on a horizontal plane. The wool is fed to these combs and their continuous progression results in a complete combing and straightening of the longer fibres, which are then drawn off by rollers and delivered as a continuous sliver, known as the " top," whilst the short fibres containing the foreign matter remaining are separated and removed as " noil."

The process known as " French combing " employs an entirely different method to achieve the same result and is more suitable for short wools.

FINISHER GILLING. Following combing two or three operations of gilling are employed similar to that before combing, but with finer pinning. The need for heat in the combs has caused a certain amount of drying of the wool and at the first of these gilling operations water is added to the wool by mechanical means in order to bring it back to a natural moisture condition. The addition of water to the top to effect a standard moisture condition is constantly checked by test and its accuracy is of considerable importance.

The sliver, now of a definite weight per given length and even in thickness throughout, is wound in to a ball of predetermined size and weight. The greatest care is taken at this stage to ensure that the ball is built so that future unwinding by the spinner can be undertaken with the minimum of waste.

2. WORSTED SPINNING

THE worsted spinner starts with the combed top, which is in effect his raw material, and converts it into yarn, either white or coloured.

Coloured yarn requires certain additional processes culminating in a coloured top, which is subjected to the same subsequent processes as the white top. Where coloured yarn is required, tops must first be dyed by one of two processes :

(*a*) Reeling into slubbing and dyeing in an open dye vat ;

(*b*) Dyeing in top form by circulating dye liquor under pressure.

After dyeing, the tops are washed off in a backwasher, dryed, recombed (in this process a high standard of perfection is required) and gilled to bring them back into a suitable form for the processes of worsted spinning proper.

Starting with a white or coloured top, the first process is termed drawing. The tops pass through a number of machines which gradually reduce the thickness of the material until with the final process, at this stage, of roving, a continuous thread of a thickness suitable for spinning is produced on a bobbin.

The rovings thus produced in the drawing department are transferred to the spinning frames which draft the roving to the thickness required for warp or weft. The single yarn produced may or may not be twisted, according to the purpose for which it is ultimately required : in the case of weft, direct on to spools or bobbins to be wound later on to pirn ; in the case of warp, on to bobbins, which are subsequently wound on to larger bobbins or cheeses for warps, cones for machine knitting, or hanks for making up into hand-knitting yarns.

3. WOOLLEN SPINNING

WOOLLEN yarns are made on what is known as the " woollen principle " and worsted yarns on the " worsted principle." After yarn manufacture, that is from warping onward, through weaving and finishing, the process is the same in both types of cloth.

In woollen spinning the raw wool is first sorted to type, scoured and if necessary carbonised. It may then go forward in the white, to be dyed in the piece later, or it may be dyed as loose wool, these processes depending on the resultant cloth required. In the next process, that of blending, the wool may be mixed with other fibres such as wastes, shoddies, hairs, and man-made fibres of all kinds.

The various fibres are fed through machines which open them out and make them light and fluffy. They are then laid down layer upon layer like a multicoloured sandwich. This large pile of raw materials is then cut into vertically, mixed together and passed through a tenterhook willey where further mixing takes place. From this machine it is transported or blown to the carding machine or put into bales for storage until required.

The carding process consists of a further mixing of the blend and straightening out of fibres. The material is fed into a hopper which automatically weighs it and passes it forward to a series of rollers which are covered with thousands of fine wire teeth. The rollers are of various sizes and revolving at various speeds, making a fine web of raw material as it passes through the machine. The material is delivered in the form of a fine soft thread preparatory to spinning. The threads are wound on to large condenser bobbins which are then taken over to the spinning mule.

The function of the spinning mule is to draw out these soft threads, the spindles revolving at the same time, putting twist into the yarn. As many as 400 spindles are connected on to one carriage of a mule. On each draw of the mule 6 ft. of yarn is unwound off the large condenser bobbins and this goes on continuously at an average of two to three draws per minute, yielding a straight, even yarn ready for going to the warping machine.

4. WEAVING AND FINISHING

YARNS are spun on to cops for warping and on to weft bobbins for weaving The large cops are set into a frame at the warping machine and with suitable tension devices are wound on to a large roller in sections, each section containing about two to three hundred threads. A full warp might contain ten sections. From this large roller the full width of the warp is wound on to a weavers beam ready for taking to the loom.

The warm beam is placed in the back of the loom and the threads are passed through the eyelets of the gears or healds. This goes through a sley to keep them even and to separate them into the full required width of the cloth. The weft bobbins previously mentioned are put into the weavers shuttle in turn, the loom is started by the weaver and the first stage of cloth making proper has begun. The shuttle travels across the warp carrying the weft at speeds varying around 100 picks per minute. The gears are lifting and dropping the warp threads to the pattern which the designer has produced, and the coloured threads in the warp and coloured yarn in the weft are woven together to this pattern.

When the piece is woven it is passed forward to the burlers and menders who go over it for faults and repair them before the piece goes forward to the scouring and milling.

The scouring process consists of washing the piece free from all dirt and grease and making it in a fit condition to pass to the milling machine. The piece of cloth may at this stage be considerably wider than what is required to be finished and the milling machine is the machine that decreases the width by the pressure of rollers one on top of the other. During this operation soap is used to help the shrinking process and keep the piece from rubbing. All surplus soap is then washed out, and the piece is ready for drying. It passes through a heated chamber and comes out dry and conditioned ready for the finishing process.

The finishing process is an intricate series of machines which treat the cloth in various ways. Cutting machines are used to crop off the surplus hair from the surface of the piece to give the smart appearance, pressing machines to give the handle and many other machines are used to give various types of finish.

After finishing, the piece is ready for passing to the warehouse to be despatched to the tailor or clothier for making into garments.

APPENDIX IX

Glossary of Technical Terms

BACKWASHING MACHINE : A machine giving a light washing process to continuous slivers and having provision for drying by either hot air or direct contact method.

BEAM : See WEAVERS BEAM.

BOBBINS : Containers for the product of intermediary drawing and spinning processes. See also CONDENSER BOBBINS AND WEFT BOBBINS.

BOWL : See WASH BOWLS.

BURLERS AND MENDERS : Operatives who remove imperfections from cloth and who sew in yarn to make good, broken warp threads or broken picks.

BURRY WOOL : Wool, heavily charged with vegetable and other impurities, removed by the carding machine.

BURRS : Vegetable impurities in wool.

CARBONISING : A process, in which wool is immersed in a solution of sulphuric acid, and heated, to a known temperature, by which means vegetable impurities are disintegrated and destroyed.

CARDING AND SCRIBBLING MACHINE : A machine consisting of multi-sized rollers travelling at variable speeds for the opening and straightening out of wool fibres on the woollen principle.

CHEESES : Paper containers on which yarn is wound to form a package with parallel edges.

COILER : A mechanical device which causes a continuous sliver to be deposited into a cylindrical can in such a form that future withdrawing can be undertaken without felting.

COMBS : Types used :

NOBLE : A circular comb with a continuous process.

SCHLUMBERGER or FRENCH COMB : A straight action comb with an intermittent process.

LISTER COMB : A machine which gives a gilling and combing action and is specially suitable for long wools, mohair and alpaca.

HOLDEN : A square motion comb combining principles of the Lister and Schlumberger, not in common use.

COMB CIRCLES : The pinned circular combs for combing machines.

COMBED TOPS : See DRY COMBED TOPS and OIL COMBED TOPS.

CONDENSER BOBBINS : Large wooden bobbins of various sizes up to 6 ft. used for winding on the soft threads from the carding and scribbling machine.

CONDITION : The moisture content of wool in any form.
See also TRADE CONDITION STANDARDS.

CONES : Paper containers on which yarn is wound to form a package shaped like a cone.

COPS : Large sized packages of woollen yarn specially prepared for use in the warping machine.

COUNT : The measure of the thickness of worsted yarn representing the number of hanks (560 yards) in 1 lb. of yarn.

CUT : A subdivision of a warp by length which will ultimately form a component part of a finished piece of cloth.

DRAFTING : The process of drawing out or reducing the thickness of a continuous length of material in thread form.

DRAWING : The first process of worsted spinning whereby tops are levelled out and reduced to the required thickness for spinning.

DRY COMBED TOPS : Tops made principally for the continental system, without the addition of oil, and having a fatty matter content of 0.634 per cent.

DRYING : See WOOL DRYING MACHINE.

FALLERS : Straight pinned metal bars employed in gill boxes.

FRENCH COMBS : See COMBS.

FULLING : See MILLING.

GEARS OR HEALDS : A large frame suspended in the loom to which wires or cotton yarns are attached, with an eyelet in the centre through which the warp threads pass for making the pattern in the cloth.

GILL BOX : A machine in which wool is subjected to the action of fallers.

HANK : Reeled yarn.

HEALDS : See GEARS

HOLDEN COMB : See COMBS.

LISTER COMB : See COMBS.

LOOM, NON-AUTOMATIC : Weaving machine on which the shuttles are changed by hand.

LOOM, AUTOMATIC : Weaving machine on which the shuttles are changed automatically.

MAN-MADE FIBRES : Synthetic fibres such as fibro, nylon, etc.

MATCHING : Sorted wool of any definite quality.

MENDERS : See BURLERS AND MENDERS.

MILLING OR FULLING : A shrinking process.

MUNGO : Recovered wool derived from hard rags, tailor's clippings, etc.

NEPS : Small knots of curled fibre usually caused in the carding process.

NOBLE COMB : See COMBS.

NOIL : Short fibres separated from the top during the combing process.

OIL COMBED TOPS : Tops combed with the addition of 3 per cent of oil to assist spinning, particularly in the English system, and having a total fatty matter content of 3.5 per cent.

PICK : A thread of weft carried across the warp in the loom by a shuttle.

PIECE : A length of finished cloth.

PIECE SCOURING : The process through which cloth passes to remove dirt and grease.

PIRNS : Wooden or paper containers on to which yarn is spun or wound ready for weaving as weft.

PUNCHING : A winding operation to prepare suitable balls for the Noble comb.

RAW WOOL : Virgin wool as received from the grower.

REELING : Winding on to a revolving frame which delivers tops or yarn in a form similar to a hank of hand-knitting yarn.

ROVING : The final product of the drawing process.

SCHLUMBERGER COMB : See COMBS.

SCOURING : SEE PIECE SCOURING and WOOL SCOURING.

SCRIBBLING : See CARDING and SCRIBBLING.

SHODDY : Recovered wool, obtained by grinding soft rags, hosiery clippings, knitted garments, etc. These are disintegrated in a rag pulling machine, producing a light fluffy raw material.

SKEIN : The measure of thickness of woollen yarn representing the number of lengths of 256 yards in 1 lb. of yarn.

SKIN WOOL : Wool removed from the pelts of slaughtered sheep.

SLEY : A grid-like frame for evenly opening out the threads of the warp to the desired width of the cloth.

SLIPE WOOL : Skin wool removed by the application of lime.

SLIVER : A continuous band of fibres.

SLUBBING : Top in the reeled form.

SLUBS : Faults consisting of bunches of knotted or unopened fibres, occurring in tops or yarn.

SORTING : See WOOL SORTING.

SPOOLS : Wooden containers on to which yarn is spun or twisted ready for weaving as weft.

SPINNING FRAME : A machine by means of which yarn is drawn out from roving to the required thickness. There are four types : Cap, Ring, Flyer, Mule.

STANDARDS : See TRADE CONDITION STANDARDS.

TENTER HOOK WILLEY : The machine consisting of a series of rollers containing large teeth for the opening out of wool fibres.

TOP : A continuous sliver of combed wool.

See also DRY COMBED TOP AND OIL COMBED TOP.

TRADE CONDITION STANDARDS : Oil combed tops, 19 per cent, dry combed tops, 18¼ per cent, yarn, 18¼ per cent, regain of moisture from absolute dryness.

TWISTING : An operation following spinning by means of which two or more threads are twisted together.

WARP : The longitudinal threads in a piece of cloth.

WASH BOWLS: A complete scouring set of machines used for the washing of wool.

WASTES: By-products from the various processes in woollen and worsted spinning and weaving.

WEAVERS BEAM: A long tubular rod with large flanges at either end on to which a warp is wrapped from the warping machine.

WEFT: The lateral threads in a piece of cloth.

WEFT BOBBINS: Small packages of yarn wound on to wooden bobbins for use in the shuttle when weaving.

WILLEY: A machine employing spiked cylinders which beat the wool against open grates to remove dust and foreign matter. This is occasionally employed before washing. See also TENTER HOOK WILLEY.

WOOL: See RAW WOOL, SKIN WOOL and SLIPE WOOL.

WOOL DRYING MACHINE: A machine for drying washed wool usually by the passage of hot air.

WOOLLEN CARD: See CARDING AND SCRIBBLING MACHINE.

WOOL SCOURING: The process through which the sorted grades of wool pass to wash out dirt and grease.

WOOL SORTING: A highly skilled process by which the fleece is sorted into various grades or qualities.

WORSTED CARD: A machine which opens up and separates wool fibres, finally delivering them as a continuous sliver.

YARN: The ultimate product of the spinning process.

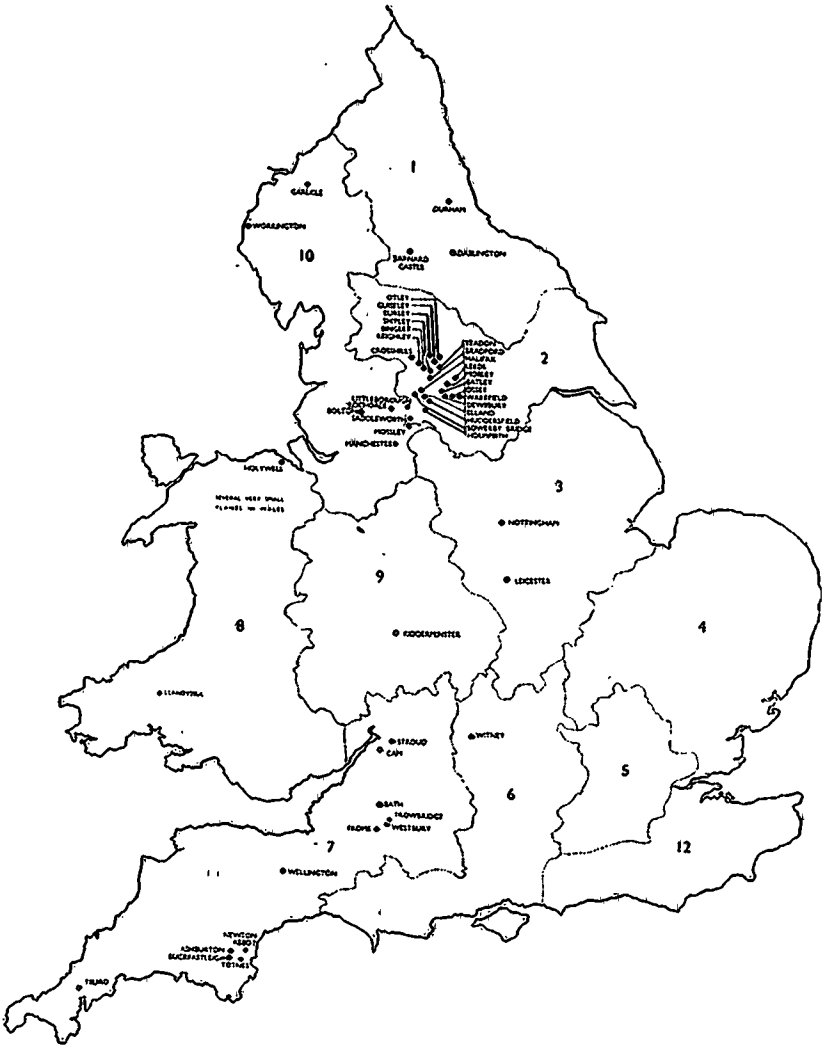
LOCATION MAP

WOOL TEXTILE INDUSTRY

LOCATION MAP—OCTOBER 1946

PLACES IN WHICH INDUSTRY APPEARS MARKED THUS ●

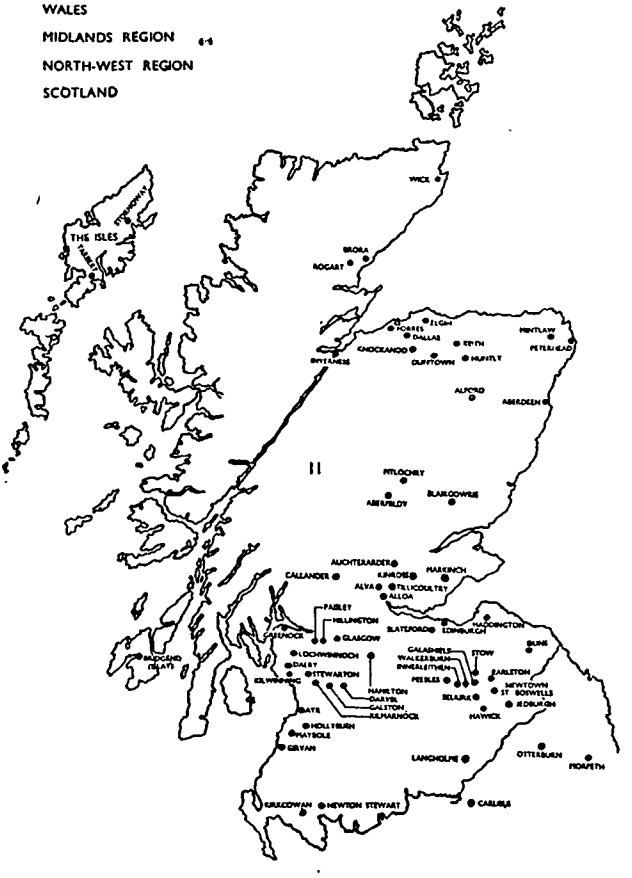
NOTE:—Size of circle does not indicate importance of units



REGIONS ACCORDING TO THE GOVERNMENT'S REGIONAL ORGANISATION OF INDUSTRY

REGION No.

1	NORTH-EAST REGION
2	EAST AND WEST RIDINGS REGION
3	NORTH MIDLANDS REGION
4	EASTERN REGION
5 & 12	LONDON AND SOUTH-EASTERN REGIONS
6	SOUTHERN REGION
7	SOUTH-WEST REGION
8	WALES
9	MIDLANDS REGION
10	NORTH-WEST REGION
11	SCOTLAND



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Working Party Reports

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BOARD OF TRADE

Working Party Reports

LACE

LONDON
HIS MAJESTY'S STATIONERY OFFICE
1947

LACE WORKING PARTY

List of Members

CHAIRMAN: Miss L. S. Sutherland, M.A., F.R.HIST.S.,
Principal of Lady Margaret Hall, Oxford.

T. Aird	Director of British Lace Furnishings Ltd.
W. Auld	President of the Scottish Lace and Textile Workers' Union.
A. Barber, M.C.	Chairman of the British Plain Net Manufacturers' Association and President of the Hairnet Finishers' and Exporters' Association.
P. A. Bentley, M.I.MECH.E.	Chairman of the Bentley Engineering Co. Ltd.
Mrs. D. Bird	Chairman of the Board of Management of the British Colour Council.
A. P. Burgass	Member of the Lace Curtain Dyers' and Finishers' Association, and of the Lace and Net Dressers' Association.
J. Masson Gulland, M.A., D.SC., PH.D., F.R.I.C., F.R.S., F.R.S.E.	Sir Jesse Boot Professor of Chemistry at University College, Nottingham.
H. A. Hind, J.P.	District Officer of the Transport and General Workers' Union, Derby.
J. G. McMeeking	Chairman of the Education Committee of the Federation of Lace and Embroidery Employers' Association and Deputy Chairman of the Lace Federation Research Council.
M. Parker	District Officer of the Transport and General Workers' Union, Long Eaton.
J. T. Severn	Secretary of the Amalgamated Society of Operative Lace Makers and Auxiliary Workers.
H. Taylor	Manager of the Kettering Clothing Manufacturing Co-operative Society, and President of the Co-operative Productive Federation.
W. I. Taylor	Honorary Secretary of the Midland Counties Lace Manufacturers' Association, and Director of Lace Productions Ltd.
A. O. Wallis	President of the Amalgamated Society of Operative Lace Makers and Auxiliary Workers.
G. D. N. Worswick, M.A.	Fellow of Magdalen College, Oxford, and member of the Research Staff of the Oxford University Institute of Statistics.

SECRETARY: Mrs. E. Potter

ASSISTANT SECRETARY: Miss P. G. Peck

LIST

OF THOSE GIVING EVIDENCE TO OR APPEARING BEFORE THE WORKING PARTY

Amalgamated Society of Operative Lace Makers and Auxiliary Workers.
Board of Trade (including the Central Price Regulation Committee, Export Promotion Department, the Patent Office, and the South-Western Regional Office).
Boden & Co. Ltd.
British Colour Council.
British Embassy in Washington.
Council of Industrial Design.
Professor W. Davis, M.A., University College, Nottingham.
Department of Scientific and Industrial Research.
Electric Lamp Manufacturers' Association of Great Britain Ltd.
Federation of Lace and Embroidery Employers' Associations, comprising:

- Association of Plain Net Finishers.
- British Plain Net Manufacturers' Association.
- Hair-net Finishers' and Exporters' Association.
- Lace and Net Dressers' Association.
- Lace Curtain Dyers' and Finishers' Association.
- Midland Counties Lace Manufacturers' Association.
- Nottingham Embroidery Manufacturers' Association.
- Nottingham Exporters' Association.
- Nottingham Lace and Net Finishers' Association.
- Warp Lace and Net Manufacturers' Association.

Mr. W. P. Hadrill, Headmaster of the Technical School for the Textile Trades, Nottingham.
John Heathcoat & Co.
Mr. John Jacoby.
Lace Export Group.
Lace Machine Builders' and Allied Trades Association.
Lace Federation Research Council.
Long Eaton Card Punchers' Association.
Ministry of Labour and National Service (including the Scottish and South-Western Regional Offices).
National Council of the Scottish and Nottingham Lace Furnishing Manufacturers' Associations.
Representative Trade Designers and Draughtsmen and Commission Jacquard Card Punchers.
Mr. A. H. Rodway, A.R.C.A., Principal of the Nottingham College of Art and Crafts.
Scottish Lace and Textile Workers' Union.
Ald. Robert Shaw, J.P.
Shepshed Lace Manufacturing Co. Ltd.
Textile Institute.
Wholesale Textile Association.

To the President of the Board of Trade

Sir,

We were appointed in March 1946 as a Tripartite Working Party with the following terms of reference:

> 'To examine and inquire into the various schemes and suggestions put forward for improvements of organization, production and distribution methods and processes in the [Lace] industry, and to report as to the steps which should be adopted in the national interest to strengthen the industry and render it more stable and more capable of meeting competition in the home and foreign markets.'

We were informed, however, that matters concerning the relations between employers and employees which are dealt with by Employers' Federations and Trade Unions did not come within the scope of our inquiries. It is of course clear that an essential pre-condition of the fulfilment of our recommendations is a mutually satisfactory machinery for the negotiation of wages and working conditions within the industry.

We now submit our report.

We met in Nottingham, holding our first meeting there on 8 April 1946. Visits have been paid to many factories in Nottingham, Derby, Long Eaton, and other places in the vicinity, to the plain net producing centres of Tiverton and Chard, and to the lace furnishings manufacturing area in the Irvine Valley in Ayrshire, where the greater part of the lace furnishings production now takes place. A special sub-committee of the Working Party was set up to consider problems peculiar to this latter area. We have held 29 meetings as a full Working Party, and the four sub-committees (Production, Distribution, Research and Training, and Scottish Affairs) have met frequently. Conditions are at present changing very rapidly, and references throughout the text of the report to 'the present' apply to the autumn of 1946, unless the contrary is specified. The organizations and individuals whom we list submitted evidence or appeared before us.

At the beginning of October, a delegation of seven members of the Working Party accompanied by the secretary, visited lace-producing centres in France, where we met with the most cordial reception and obtained comparative information of high value to our work.

Our thanks are due to Mr. H. L. Holliwell, whom we co-opted to help us in our deliberations on the Lace Furnishings section; to the Employers' Associations and Trade Unions concerned for their assistance in the collecting of statistical and other information; to Miss W. M. Saywell, M.B.E., Secretary of the Federation of Lace and Embroidery Employers' Associations for much practical advice and help; to the Nottingham Chamber of Commerce and the Amalgamated Society of Operative Lace Makers and Auxiliary Workers for putting

accommodation at our disposal; to all those who lent us the photographs which are reproduced in our report, and to the manufacturers in all lace-producing centres and the machine-builders who showed us round their factories and who allowed us to draw on their experience of the industry. We are also grateful to the Regional Controller of the Board of Trade and the Regional Controller and Deputy Controller of the Ministry of Labour and National Service in the North Midlands Region, and to the District Inspector of Factories in Nottingham for much material and expert information, and to all those who went out of their way to render us assistance.

Finally, we wish to thank Mrs. E. Potter, our secretary, and Miss P. G. Peck, our assistant secretary, both of the Board of Trade, for their excellent work on our behalf.

OXFORD. 19 DECEMBER, 1946

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Leavers lace machine and its products

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Nottingham lace curtain machine and its products

More products of the Nottingham lace curtain machine

Warp lace machine and its products

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Plan of Leavers lace factory

PART I. Introduction

CHAPTER I. OUTLINE OF THE STRUCTURE AND HISTORY OF THE INDUSTRY

THE lace industry should more properly be considered as a group of industries related by the circumstances of their development and (to a greater or less degree) by their employment of similar machines and processes, their use of certain common service firms and organizations, and the similarity of their products.

These industries, or sections as they are commonly called, are six in number. The three most important of them, (1) the Leavers or fancy lace, including hair-nets and veilings, (2) the Lace Furnishings or Curtain, and (3) the Plain Net or Bobbin Net sections, together with (4) the small Warp Lace section, make up the traditional machine lace industry as developed in England and Scotland in the nineteenth century, the prototype of all such industries throughout the world. The remaining two sections, (5) the Barmen or Braid Lace section (consisting of one large and two small firms), and (6) the Embroidery section (producing embroidery on plain net or on a dissoluble base) are of comparatively recent growth, are based on continental experience, and stand somewhat apart in their organization and technique.

The chief processes in the production of each of the first four sections are:

(1) preparation of the yarn for the machines;

(2) the weaving of the yarn into a web on the lace machines;

(3) its bleaching, dyeing and dressing;

(4) its 'finishing' (i.e. scalloping, clipping, carding, packing, etc.);

(5) its marketing.

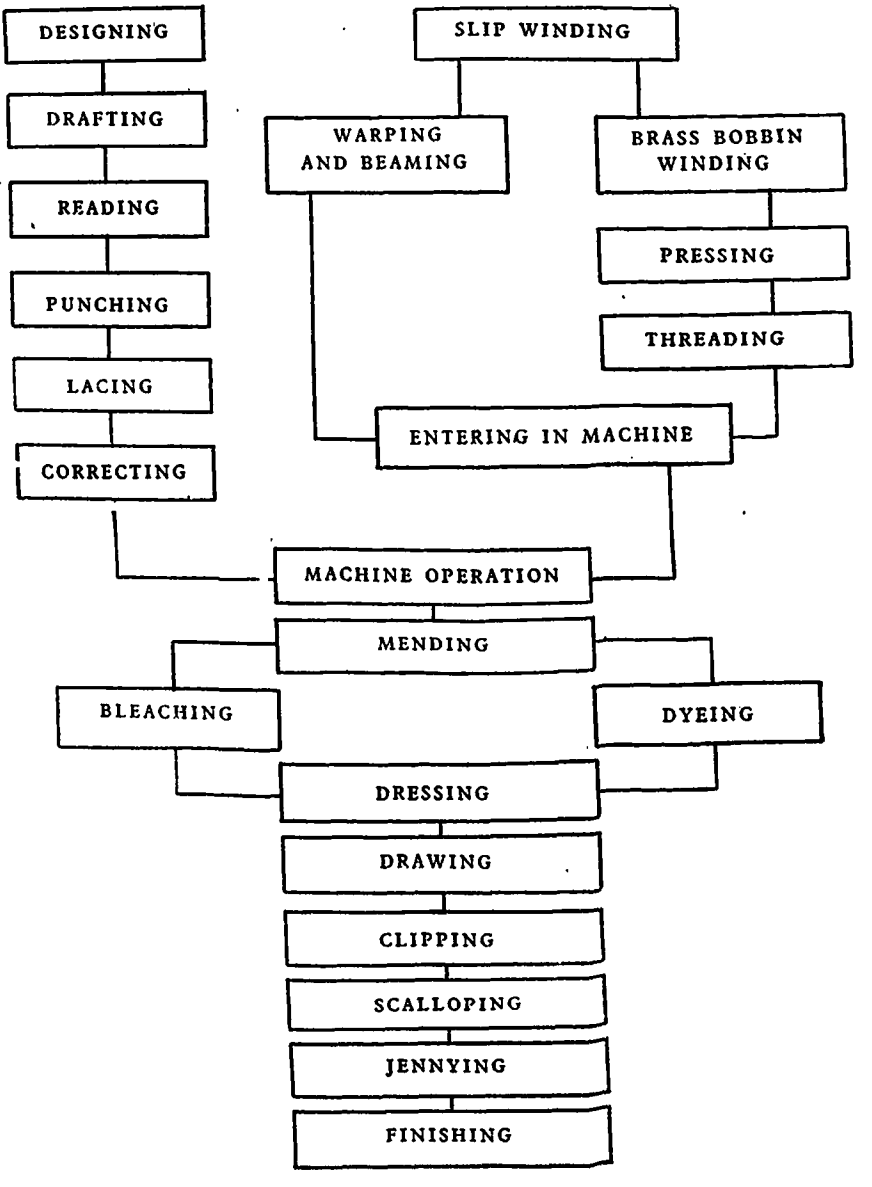
The processes involved can be seen from Diagram 1.

We have thought it useful to print illustrations of the various types of lace machines and products.

The organization of the industry, though it varies somewhat from section to section, tends to be horizontal rather than vertical. Thus, while the machine-holders* normally carry out processes (1) and (2) (though some of the smaller firms have part of (1), the 'warping', carried out for them on commission), process (3) is largely carried out by specialist firms of dressers working on commission, and in some sections firms of finishers, a type of merchant-converters, not only carry out processes (4) and (5), but purchase the lace 'in the brown' from the machine-holder as it comes off the machine, and make themselves responsible for all processes after that stage. This function of the finisher was originally characteristic of all sections of the industry, but, except in the Leavers section, changes in industrial organization have now considerably reduced his role. While the machine-holder usually confines his activities to one section of the industry, the dressers and finishers often find it convenient to handle the products of several.

* We avoid the term manufacturers, since it is commonly applied to the lace finishers, who, as a rule, own no machines, and we make use throughout of this term traditional in the industry.

DIAGRAM 1. PROCESSES INVOLVED IN MAKING LACE*



*Reproduced from the U.S. Tariff Commission Report 1934: Laces and Lace Articles (No 83, second series, p. 179).

In addition to the manufacturing and marketing processes referred to above there are certain ancillary processes, of which designing, draughting and jacquard card-punching are the most important, which are sometimes carried out by the firms producing lace, but often by specialist firms.

MANUFACTURERS' ORGANIZATIONS

The interests of the employers in the various sections of the industry are represented by the following associations:

(*a*) *Machine-holding sections*

*Midland Counties Lace Manufacturers' Association. [Leavers machine-holders.]

*Scottish Lace Furnishing Manufacturers' Association.

*Nottingham Lace Furnishing Manufacturers' Association.
[These last two together form the National Council of Scottish and Nottingham Lace Furnishing Manufacturers' Associations.]

*British Plain Net Manufacturers' Association.

*Nottingham Embroidery Manufacturers' Association.

*Warp Lace and Net Manufacturers' Association.

(*b*) *Dyeing and Dressing Section*

*Lace Curtain Dyers' and Finishers' Association.

*Lace and Net Dressers' Association.

(*c*) *Finishers and Merchants*

*Nottingham Lace and Net Finishers' Association.

*Association of British Plain Net Finishers.

*Hair-net Finishers' and Exporters' Association.

*Nottingham Exporters' Association.

(*d*) *Ancillary Sections*

The Nottingham and District Lace Designers' and Draughtsmen's Association.

Long Eaton Card Punchers' Association.

TRADE UNIONS AND EMPLOYEES' ASSOCIATIONS

The following Trade Unions represent the interests of the workers:

(*a*) *Machine-holding and Finishing Sections*

†Amalgamated Society of Operative Lace Makers and Auxiliary Workers.

†Scottish Lace and Textile Workers' Union.

Transport and General Workers' Union.

*Affiliated to the Federation of Lace and Embroidery Employers' Associations.
† Affiliated to the British Lace Operatives' Federation.

(*b*) *Dyeing and Dressing Section*

National Textile Union.

(*c*) *Ancillary Sections*

*British Association of Lace and Embroidery Designers and Draughtsmen.

*Amalgamated Society of Lace Pattern Correctors, Press and Piano Punchers.

*Nottingham and District Warpers' Association.

The traditional organization of the industry, with its sharp distinction between machine-holders and finishers and the development of specialized firms carrying out processes on commission, was the result of the economic structure of the industry in its early days. The pioneer work of the inventors was financed and exploited by men with considerable capital (often acquired in the hosiery trade), but these inventors were followed by the class of small machine-holder risen from the ranks of the artisans, possessed of considerable skill but little or no capital. Their appearance meant that the production of the rapidly expanding industry had to be financed by the machine-building firms at one end and the merchant capitalists at the other. Under no other system could the industry, in the circumstances of the time, have developed with such remarkable rapidity.

Though attempts to make lace net on the fancy stocking frame had been in progress since 1760, and though both the 'point-net' machine and the warp lace machine (which is still in use) achieved a considerable output, the history of the lace machine may be said to have begun with John Heathcoat's invention in 1809 of his second bobbin net machine. This was followed by John Leaver's adaptation of it in 1813 to make the prototype of the machine still known by his name and which, when improved thread control was achieved by the use of the jacquard principle, became the basis of the fancy lace machine of the present day. In 1846 the first curtain machine was patented, and by 1851 there were about 100 such machines in the Nottingham area. Though these machines have undergone much technical development, and in particular have greatly increased in size and speed, their main principles remain unchanged.

Heathcoat set up his first machines in Loughborough and, after their destruction in the Luddite Riots of 1816, moved to Tiverton; but Nottingham with its immediate surroundings was the historic centre of the industry. The big development of manufacture on curtain machines in the Irvine Valley has, since the 1870's, made Scotland the biggest producing area for lace furnishings, and there is a considerable production of plain net in Tiverton, Barnstaple and Chard; but Nottingham continues to hold a position of pre-eminence in what is still a highly localized industry.

The growth of the lace industry in the nineteenth century was very rapid, though subject to violent alternations of fortune. These were in its earlier days due in part to the rapidity of technical advance and to the speculative attitude which such progress engendered (in 1823, for instance, after the expiry of Heathcoat's patent, there was a great boom in machine production followed by a serious slump), but were also attributable to the vulnerability of the product

*Affiliated to the British Lace Operatives' Federation.

to the effects of cyclical depression and to sudden reversals of fashion. In the second half of the century these fluctuations followed a fairly regular course, particularly severe crises occurring, however, in 1876 as a result of the international crisis of 1873–4 and in 1886, and proving fatal to a number of firms. It may be of interest for the future of the industry to note that the most serious of the crises affecting the lace industry were those which affected the nation, or even the civilized world, as a whole; so that, until the great change in fashions following the 1914–18 war, the instability of the industry was due more to causes connected with the economy as a whole than to any causes directly related to the industry itself. Despite these setbacks, the industry reached what would appear to have been its highest peak of prosperity in 1907 when it employed over 40,000 workers.

Already, however, some of the conditions of its coming decline had become apparent. The English machine-builders had preserved throughout a supremacy in production that amounted to a monopoly, but the export of British machines, both new and secondhand, led early to the setting up of industries in foreign countries, frequently under the initial enterprise of British manufacturers and workmen. The earliest of these foreign industries to compete with the British manufacturer on his export and even his home market was the French. Though after the invention of the bobbin net machine it was long before the French were able to compete in the plain net trade, and though they had made comparatively little progress in the lace furnishings trade, their Leavers trade in Calais and St. Pierre showed from an early date much skill and enterprise, and first in silk laces and then in fine high-class cotton laces began to outclass Nottingham itself. By 1914 they had almost as many Leavers machines working as Nottingham, and it was already clear that, if the world market should contract, their competition would be very serious to the British industry. Both France and England had, moreover, for some years been feeling the competition of the machine-embroidery products of St. Gall in Switzerland, and Plauen in Saxony, while other nations, though their industries were unable to compete on the open market, were erecting tariff barriers to protect them on their home markets. Most serious of these developments was that of the U.S.A., the biggest lace-importing country, who in 1909 increased their import duties on all types of lace, and sought to stimulate their Leavers industry by a temporary remission of duty on the import of machines.

The interruption of the First World War and the destruction of important markets which accompanied it, the drastic change in fashions, and the violent boom which succeeded the war, ending in the crash of 1921, plunged all lace-producing areas into the longest period of depression in the history of the industry. In the United Kingdom the Lace Furnishings section was the least seriously affected; and by 1927–28 it was enjoying boom conditions again. The Leavers section suffered the most acutely and showed less powers of recuperation than its French rivals. The Plain Net section, through badly shaken, retained its share of the world markets for the time, though in the 1930's it was to suffer severely under the competition of the French industry at Caudry, rebuilt on modern lines after destruction in the war, and of the German industry aided by barter arrangements. In the Leavers section an American consular report estimated that 168 firms went out of business during and after the war, and 600 to 650 machines were scrapped or sold. The Calais industry was less seriously affected, and by 1924, 2,600 machines were in employment in Calais against

less than 2,000 in Nottingham and Long Eaton.* Calais even continued to expand a little. In 1931 there were 2,909 machines there.

It was to protect the English Leavers industry on the home market against French competition, the increased strength of which was due in part at least to a reduction in real wages (the U.S. Tariff Report of 1934 estimated that in the decade following the 1914–18 war French wages had gone up little more than 100 per cent, when the value of the franc had declined by 500 per cent), that a safeguarding duty of 33⅓ per cent on imports of all lace and embroidery goods was imposed in 1925. Owing to difficulties of identification, the products of the curtain and plain net machines were given the same protection. By the terms of the Ottawa Agreement of 1932 the industry also obtained a preference in Empire markets.

As a result of these and other circumstances, the position of the industry gradually became stabilized, and a slight upward movement in production became evident, only to be cut across by the events culminating in the Second World War. During the greater part of the inter-war years the industry suffered the disadvantages which usually accompany acute depression; short time and unemployment among labour, price cutting and debasement of quality among manufacturers, an absence of inducement towards the modernization of plant, and a lack of confidence in the prospects of the industry.

On the outbreak of war, it seemed as if the industry would be eliminated or reduced to a shadow of itself until the return of peace; but, with the development of military operations in the Middle East and the Far East, sandfly, mosquito and other nettings became of first-rate importance. In consequence, the Plain Net and Lace Furnishings sections received large government orders from the Ministry of Supply.

It was evident, however, that even with war orders the lace industry, except in the Plain Net section, would have to contract very greatly. Schemes under the White Paper on the Concentration of Production 1941 were therefore undertaken for the following sections:

(1) Lace Furnishings.

(2) Leavers.

(3) Warp Lace.

(4) Dyers and Dressers (2 parallel schemes).

Two of these schemes are of a novel character, and have been very successful, namely British Lace Furnishings Ltd. (Lace Furnishings section of Nottingham and Scotland), and Lace Productions Ltd. (Leavers section). In these two cases, the firms in the section (some 90 to 95 per cent participated) placed their fate in the hands of an elected board of directors who carried out all negotiations with government departments, obtained and dealt with allocations of yarn received during the war for all purposes, and directed how many and which machines should be used and how the permitted labour force of the section should be distributed. The first charge on the profits was 'care and maintenance' of closed

*U.S. Tariff Commission Report 1934: Laces and Lace Articles, p. 140. The return made to us showed fewer than 1,400 Leavers machines in use in Nottingham and Long Eaton in 1923 but there was known to be in addition a considerable number in the hands of firms which had ceased production.

factories and idle machines, and thereafter a dividend was paid, using as the measure in the Lace Furnishings section the basic productive interest of each member firm in the industry's total output and in the Leavers section the number of machines held. In point of fact, as a result of sound management, and in the case of British Lace Furnishings Ltd. of the co-operation of the Ministry of Supply in the placing of contracts, both companies have been most successful since their formation.

The other concentrations were based on 'pool and levy' schemes, with a priority for 'care and maintenance', and they seem to have worked admirably.

CHAPTER II. METHODS OF APPROACH ADOPTED BY THE WORKING PARTY

IN beginning our investigations of the nexus of industries with which we were concerned, we thought it necessary to make a careful analysis of their structure. We were led to this conclusion by the fact that the lace industry in this country has never been the subject of a full-scale investigation; there is no published account of its structure and activities comparable to that given for the U.S. industry in the 1934 Tariff Commission Report,* and, even within the industry itself, we found considerable uncertainty on basic questions of fact. Proposals for the future of the industry cannot be formulated except on the basis of sound knowledge of its present organization.

Since wartime conditions have been, and present conditions still are, entirely abnormal, and since the lines of the industry's future cannot begin to show themselves until supplies of raw material become sufficient to permit work at something more nearly approaching capacity, we determined to focus our attention on the years immediately preceding the war. The published statistics proved wholly unsatisfactory for our purpose, but we were fortunate in enlisting the support of the various trade organizations and, mainly through their good offices, we have been successful in amassing a considerable body of valuable statistical material obtained in answer to questionnaires. We also received much help from the Statistics Division of the Board of Trade, who made extracts from published statistics, and rearranged the material on which some of them were based into a more useful form. Using as our basis this material, together with the little published information available, the evidence submitted to us and our own observations, we have sought to bring out the main features of the British industry and to assess the changes in conditions that may be expected in the post-war world, both on the side of supply and demand. As a result, we are able to indicate what are, in our opinion, the lines on which the industry should advance. Our conclusions are expressed in the form of a number of concrete proposals for action and of the statement of certain problems for solution in the light of future events.

It should be stated at once that we have found no sovereign specific for the success of the industry in the coming years. The industry is, in some respects, a peculiar one and a variety of factors, including its dependence on fashions, combine to make inapplicable to it many of the measures which are proving

* The standard account of the earlier years of production. *See end of Chapter, p. 35.*

successful in other fields. Moreover, no revolution in industrial technique can be expected in the foreseeable future which might lead to a sweeping increase in production per man-hour: nor have our investigations led us to believe that productivity can be strikingly stepped up by changes in industrial organization. On the other hand, we believe that efficiency can be considerably increased by a variety of measures and that it must be so increased, if the industry is to maintain its pre-war output, and still more if it is to increase its contribution to the export trade and to the nation's wealth in general. For while in many respects the outlook of the industry would seem to be more favourable than in the past, in certain others it is likely to be considerably less satisfactory.

The various sections of the industry present in many respects different problems, but they resemble each other in bearing upon them, like most of the British textile industries, the characteristics of a long-established trade. There can be no doubt that in structure, in layout, and to some extent in plant, an industry newly founded would differ considerably from the British lace industry as it may be seen today, though it is also certain that one so founded would be severely handicapped by the absence of *expertise* and of the traditions of craftsmanship which the British industry enjoys. It is significant that the newer centres of lace production have shown little power of extending their markets beyond the shelter of their tariff walls and that the predominance in world exports is still held by the nations early in the field in this form of production.

We believe that the sound line of advance for the industry is to emphasize the strength while eliminating the weaknesses of the present organization. We consider that in all sections, with the exception of the Plain Net section, the small-medium machine-holding firm has shown itself the most satisfactory economic unit, and that in all sections to some and in some sections to a great extent a structure of specialized firms to carry out auxiliary processes and for marketing is a useful corollary to the existence of the small machine-holder. In an industry whose products are so highly specialized, and in which the element of fashion and taste enters so largely, the small *entrepreneur* is well fitted to hold his own, and the organization centring in Nottingham is designed to enable him to do so. On the other hand, these conditions and the accompanying tendency towards violent fluctuations of demand have in the past brought out some of the gravest disadvantages of excessive competition and individualism. The impression conveyed by the industry to an interested outside observer, is one of widespread technical skill and pride in their work on the part of both employers and workpeople, but also (despite the enlightened views of many individuals) of intense individualism and a good deal of aversion to change, an outlook which has hampered the industry in the past and made difficult any co-ordinated approach to the problems of the industry or of any of its sections. While the years immediately preceding the war saw some modification of this isolationism and the experiences of war seem likely to reduce it still further, it is clear that much remains to be done before the industry can be said to be doing all in its power to combine elasticity and enterprise with the elimination of the most serious disadvantages of the traditional system.

Our specific recommendations depend on our judgement of the post-war prospects of the industry. We begin, therefore, by attempting a rough estimate of the probable demand for lace products in the future, and we then consider the problems of supply which will be encountered if this demand is to be met.

The Prospects for Lace Exports

In the following paragraphs, we draw attention to the main trends and movements in British lace exports since 1913. We wish to make it clear at the outset that our sole purpose is to throw light on general movements. In the first place, it seems certain that the total of exports given by the Board of Trade falls considerably short of actual exports. For example, for the year 1937 the Board of Trade gives a total of £2,019,000. From the Working Party questionnaire we obtain for the respective sections the following approximate figures for exports:

Leavers .	£1,200,000 to £1,400,000
Lace Furnishings	£ 500,000 to £ 600,000
Plain Net	£1,200,000 to £1,300,000
	£2,900,000 to £3,300,000

To this should be added a small amount for the remaining sections. The official figures thus appear to be considerably too low. It is, of course, possible that the Leavers and Plain Net sections have somewhat over-estimated their pre-war ratio of exports to total production, but the difference is too great to be accounted for in this way.

The separate categories of exports also do not correspond very closely with the exports of the respective sections of the industry. In particular, exports of the Lace Furnishings section were undoubtedly substantially greater throughout the period than the amounts classified under cotton curtains. Nevertheless, the figures may suffice to indicate broad movements.

It will be seen from the wide fluctuations pictured in Charts 1, 2 and 3, that it is almost hopeless to attempt to discern trends in British exports of lace and lace articles which might be used to predict probable future demands. We are obliged, nevertheless, to establish some figure as a working hypothesis. Accordingly we set out here a few of the outstanding features of lace exports from 1913 to 1946, and one or two additional considerations which may be relevant.

Chart 1 shows the movement of total exports. The period 1913–21 is one of the most violent fluctuations, the value in the boom year of 1920—£8·79 million—being well over twice the value of exports in 1913. In 1921 the slump was even more startling than the boom, the value falling to £2·8 million. Thereafter we can discern two fairly distinct periods: 1922–31, one of overall decline from about £2·5 million to £1·2 million a year; and 1931–39, a period of slight recovery, ending again at a low level, but this time no lower than at the beginning. During the second war, the recovery of 1940–41 was short lived, owing to the policy of limitation of exports pursued after November 1941, but when the war ended the recovery was very sharp. Re-exports of imported lace ceased to be significant soon after the safeguarding duties were imposed. In Chart 2 the movement of the three principal categories—cotton net, cotton curtains and cotton lace (Leavers) are graphed separately from 1921 to 1938. The year-to-year movements in all cases are similar. Looking at the trend, it appears that cotton net suffered least, while the share of cotton lace (Leavers) fell distinctly until 1930, though there was a slight relative recovery in the later period.

EXPORTS & RE-EXPORTS OF LACE PRODUCTS FROM THE UNITED KINGDOM 1913-1946

CHART I

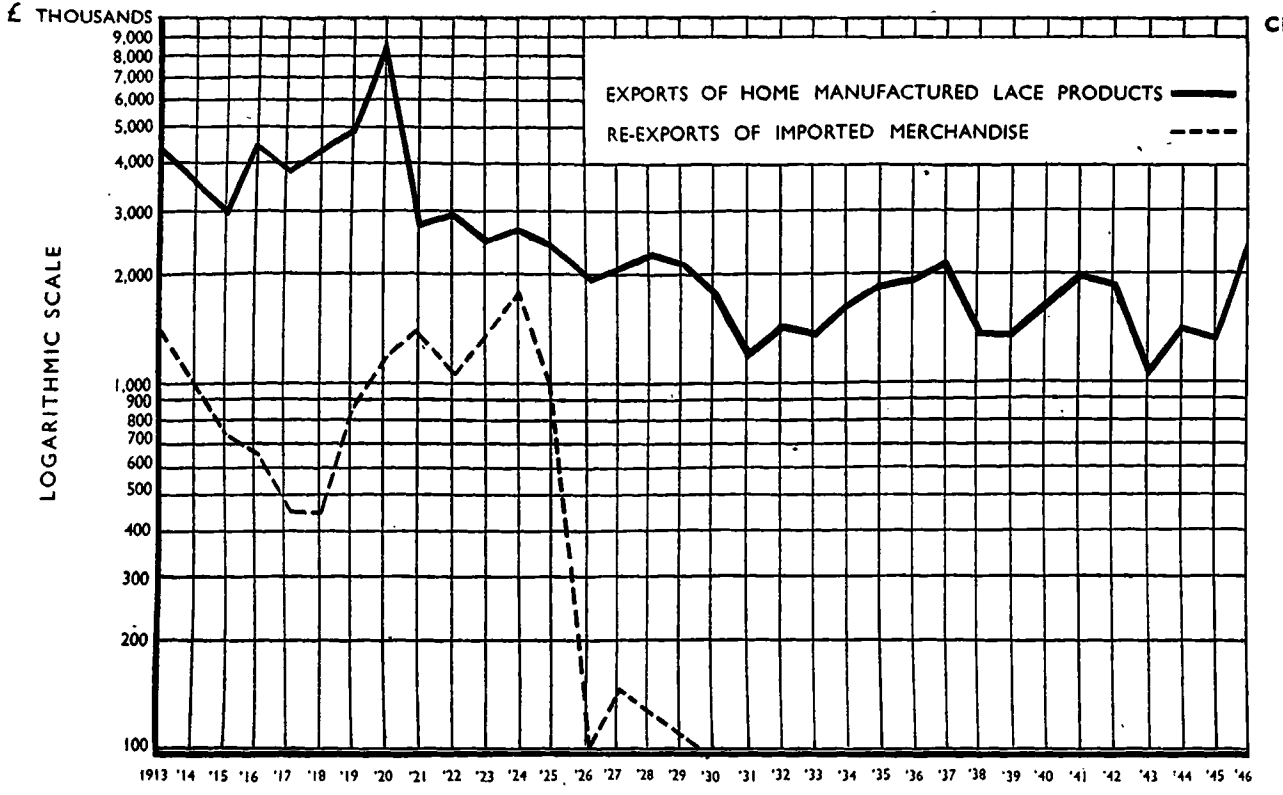
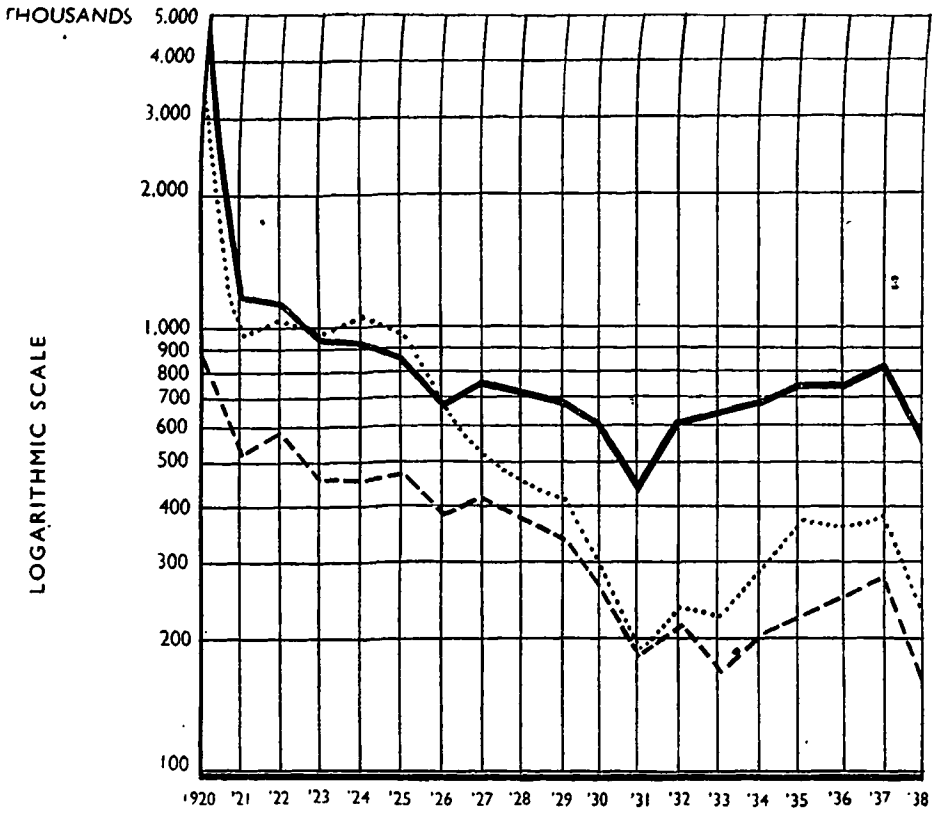


CHART 2



BRITISH EXPORTS OF HOME MANUFACTURED LACE PRODUCTS 1920-1938

COTTON NET ——

COTTON LACE .....

COTTON CURTAINS – – –

BRITISH & FRENCH EXPORTS OF LACE PRODUCTS
1913 - 1940
IN MILLIONS OF CURRENT U.S. DOLLARS.

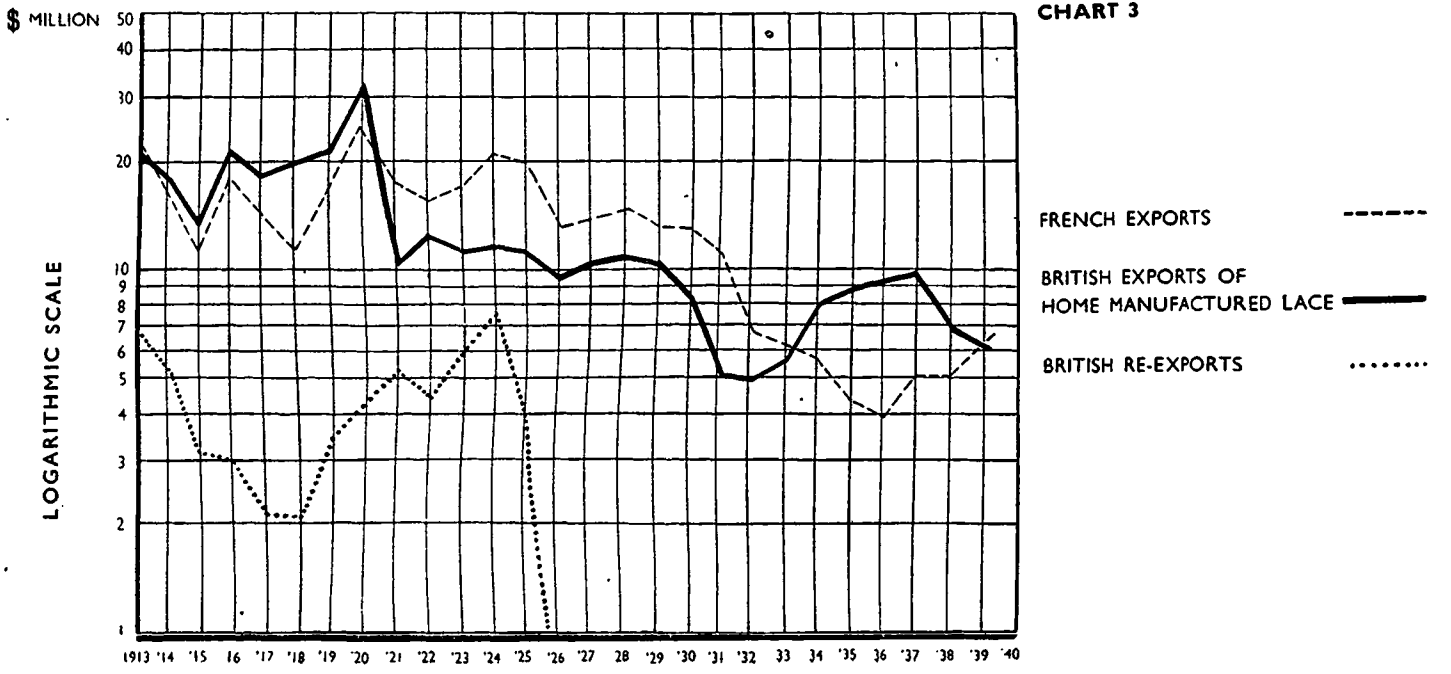


CHART 3

It would be important to know to what extent the fluctuations in the value of lace exports are price fluctuations, and to what extent changes in the volume sold are involved. We may get some indication by comparing the movement of the Board of Trade wholesale cotton price index over the same period. We find that the 1920 boom was largely a price boom, but the slump of 1921 onwards was predominantly a fall in the volume of goods sold. By the time cotton prices broke in 1924–25, the value of lace exports was already down to rather over one-half of pre-war exports. There is little doubt that from year to year there is a close connection between the movement of cotton prices and the value of lace exports.

Britain and France

British lace exports are a function of the world demand for lace products, and of the share which Britain retains in total exports. The latter is mainly a question of French competition. Table 1 shows the relative shares in total exports of the principal exporting countries of lace products in 1913 and 1938.

TABLE 1

EXPORTS OF LACE PRODUCTS OF THE PRINCIPAL EXPORTING COUNTRIES, 1913 AND 1938

	1913		1938	
	Value $ thousand	Percentage of Total	Value £ thousand	Percentage of Total
United Kingdom	17,516	38·7	1,392	31·8
France	17,314	38·2	1,077	24·6
Germany	6,650	14·7	533	12·2
Italy	994	2·2	478	10·9
Switzerland	1,005	2·2	162	3·7
Czechoslovakia	—	—	108	2·5
Belgium	1,640	3·6	56	1·3
China	94	0·2	322	7·3
Japan	—	—	216	4·9
U.S.A.	232	0·5	36	0·8
	45,265	100·0	4,379	100·0

Can we throw any light on this problem? In Chart 3 the values of British and French lace exports 1913–38, expressed in current U.S. dollars, are compared.

The chart shows four distinct periods. (1) 1913–20: the year-to-year movements are sympathetic; in every year the British exports exceed the French, and there is a slight tendency for the gap to widen. (2) 1921–31: British and French exports both fall off steadily. The year-to-year movements after 1924 are again sympathetic, but this time French exports keep steadily ahead of the British. (3) 1931–36: British exports rise sharply and once more exceed French exports, which fall sharply. In 1936 British exports were double the French. (4) 1936–39: this time British exports fall sharply and French exports rise to catch up again in 1939.

The significance of the rate of exchange in this context is clear enough. (1) In 1913–18 the rate of exchange was steady, and there was only a slight change in the relative position of exports in favour of Britain. The sudden relative fall in French exports in 1918 was probably determined entirely by supply conditions. (2) In 1918 the franc broke; by 1920 its sterling value was halved; it steadied for a couple of years, and then by 1926 was halved again. In this period French exports caught up and remained ahead of British. (3) In 1931 Britain left the gold standard and the franc rose in value in relation to sterling, and the British exports rose while French exports fell. Then in 1936–37 the devaluation of the franc started again. British exports fell and the French rose.

Then there can be little doubt that the British share of any future world demand for lace products will depend to some extent upon the sterling value of the franc: stability of the franc would be one factor making for stability of British lace exports. But we cannot say more than that. Since 1938 there have been violent increases in costs in both countries, particularly in France.

The present sterling value of the franc is, indeed, just over one-third of the 1938 rate, but it is doubtful whether this need mean any fall in the share of British exports, the French inflation having, as it were, caught up with and even gone ahead of the external devaluation. At October 1946 it appeared that the relation of French and British wages, coupled with the then ruling rate of exchange, were such that the French industry did not enjoy any competitive advantage.*

Present form in the export trade must, in the light of the 1919–21 experiences, be heavily discounted in hazarding a guess about trends. There are, nevertheless, some pointers towards a somewhat higher volume of world exports in the coming years after the exhaustion of the piled-up demand of wartime. They may be listed as follows:

(i) A higher level of income all round. Too much should not be made of this. The present over-employment is a direct result of the war. We may, however, suppose that governments will be more prompt to take measures to counter depressions, or at least to stimulate recovery.

(ii) A possible recovery in dress laces; in the inter-war period fashion ran consistently against the Leavers section both at home and abroad. Signs of a reversal could be detected in the 'thirties. Certainly a repetition of the catastrophe of 1921–29 is impossible.

(iii) The further development of colonial markets, which appear to offer considerable scope.

(iv) The possibility of some reductions in tariffs, which are very high for lace products in some countries.

Against these favourable trends must be set the possibility of the reduction in the demand for plain net if chemical defences against insects are perfected.

A cautious guess—it is no more—of a world demand 10 to 20 per cent greater than the years 1933–38 is perhaps not unreasonable. How much increase does this mean for Britain, ignoring for the moment any special efforts to stimulate lace exports? This will depend on: (1) the sterling value of the franc; (2) the policy with regard to exports of ex-enemy countries. For (1) we shall here

* See Appendix II.

assume no improvement in the ratio of British and French exports as against pre-war. (2) The countries involved are Germany, Italy and Japan. In 1938 they exported between them £1,227,000, i.e. 28 per cent of world exports.

We are given to understand that, in the longer run, the exports of the lighter industries of these countries, including textiles, are to be encouraged to replace the exports of heavy industries whose capacity is being reduced as part of the policy of demilitarization. At present it seems that the revival of these lighter exports has hardly begun, and it may take many years before the required expansion is realized. Accordingly, we shall assume that their share of world exports of lace products will not average more than 50 per cent of pre-war in the next five years, and in the following period will be equal to the pre-war share. Taking our world increase in demand at 20 per cent over 1938 (that was a poor year, so we take the upper limit), these countries would have exported £1·5 million at 1938 prices. For the first five years we have thus to divide £0·75 million between the remaining countries, who, we assume, will supply the markets hitherto filled by the ex-enemy countries. We can allocate those spoils in two ways. First, we may divide them in proportion to the shares in the total of the surviving export countries. Secondly, we may use a somewhat subtler method. We consider each country which used to take exports from, say, Germany. We reallocate German supplies in the proportion that the particular country also took supplies from the others. The figures for doing this are very inadequate, but by chance the result obtained is almost the same as that obtained by the first and cruder method, viz. United Kingdom—40 per cent; France—35 per cent; the rest—25 per cent. Thus we may fairly allocate 40 per cent of the 'spoils' to United Kingdom or £300,000. After the first five years we shall assume that these markets are regained by ex-enemy countries.

We thus get our estimate:

British exports 1933–38	£1·66 million
plus 10 to 20 per cent general increase .	£0·16 to £0·33 million
plus share of ex-enemy spoils	
(in first 5 years)	£0·30 million
(thereafter)	—

We may thus look for increases of between £160,000 and £630,000, which are respectively 10 to 40 per cent in the first five years, and thereafter 10 to 20 per cent above the average 1933–38.

It will be noted that even the higher of these figures falls well short of the general 'target' of a 75 per cent increase in merchandise exports. All that means, however, is that we cannot expect the target to be reached in lace without a special effort. Our calculations were based on the continuance of various historically given proportions (e.g. ratio of French to British exports) which may no doubt be altered in Britain's favour by the appropriate policy, to which reference is made in Chapter XII.

The Prospects for the Home Trade

For the rise in world demand for lace and lace products, we have assumed an all-round increase, above pre-war, of the order of 10 to 20 per cent. Have we any reasons to postulate a higher increase for the home market?

Before considering the magnitude of the possible increase in demand, we may say something about the probability of its maintenance. It seems that for curtains

and lace nets, the main products of the Lace Furnishings section, the greater part of whose demand probably depends as much on the size and stability of the income of the wage earners as upon fashion considerations, the prospects of stability of demand are good. We may reasonably anticipate a real income of the wage earners which will be higher than before the war, and will be maintained, not only through the prolongation of the post-war 'boom', by means of controls, but also by government policy designed in the longer run to prevent any falling off in effective demand. In this respect, home demand prospects are more certain than external demand. To set a figure for the rise in real income is difficult—but an average of 20 per cent above the pre-war years for the decade beginning 1948 would appear to be reasonable.

The extent to which lace production will benefit from this increase depends, of course, upon fashion, upon the relative prices of other curtain materials, and so on. But, in view of the great programme of house-building which lies ahead, it seems reasonable to assume the full 20 per cent, and even more, for the Lace Furnishings section. Leavers lace and embroidery are undoubtedly the most uncertain: it may be that the fashion will not, after all, revive, or it may be that a sharp increase in demand will be experienced. It is as well to be cautious, and we shall postulate a 20 per cent increase here also.

The Total Demand in the Future

Thus we take, as a working hypothesis, a modest increase in the volume of demand of 20 per cent for the home trade. For the export trade we have hazarded an estimated increase of between 10 and 40 per cent above the pre-war average in the first five years, and between 10 and 20 thereafter. As exports were roughly half of production in pre-war years,* we arrive at an increase in total demand of between 15 and 30 per cent in the shorter run, and between 15 and 20 per cent in the longer run.

These calculations, it should be stressed, are estimates of *demand*: how much we think could be sold if material, labour and plant were available in adequate supply. As we shall see, in the short run expansion may be checked by the shortage of cotton, and in the longer run the shortage of labour makes it certain that such increases in production cannot be achieved without a very great economy in the use of labour. Thus the actual development is likely to be one of excess demand for a considerable time—five years or more—which has advantages and dangers which will be considered later. Two points need to be singled out here: (i) the question of export priority obviously arises. At present, with the exception of utility curtains, table covers and hair-nets, the priority is 100 per cent export in all sections. Our long-run estimate of increase in export demand fell short of the 'target' increase of 75 per cent, but our calculation deliberately left out of account any *special* efforts to increase exports. If such measures are taken, the problem of excess demand will be aggravated and the period of priorities extended. (ii) For this very reason, our guesses about future demand must be treated with caution. If particular markets have to be starved for years the demand may, as it were, die out altogether for lack of nourishment. We suggest that this point be borne in mind in considering the making of a yarn allocation for the home trade.†

* Wells calculates exports in 1935 to have been 40 per cent of production. *Studies in Industrial Organization*, p. 69. Our own estimate for 1937 is about 60 per cent.

† See Recommendation 2.

We must now consider what are the prospects of meeting an increase in demand of between 10 and 30 per cent.

THE FUTURE SUPPLY OF LACE PRODUCTS

The industry appears likely to encounter serious problems, both in the supply of raw materials (which may be fairly short term), and in the availability of labour (which seem likely to be permanent.)

(*a*) *Materials.* The present acute shortage of all types of fibre is no doubt a temporary feature, but the prospects with regard to cotton yarn—which constituted over four-fifths of the total weight used before the war—over a longer period appear to be by no means reassuring. The Cotton Working Party estimate that the labour force of the cotton spinning industry is unlikely to reach a level higher than 65 per cent of the pre-war level. Hence the customers of the spinners are faced at the best with a severe medium-term problem of shortfall in materials, and, unless the measures proposed for increasing productivity in cotton spinning are rapidly undertaken and are successful, with a long-term problem of grave significance. What would be the solution of this long-term problem, if it occurred, it seems idle for us to consider. The medium-term problem, which seems likely to affect most seriously those sections of the industry which are heavy users of coarse count yarns, comes, however, within our province. We make recommendations designed to give some assistance to these users on which we would lay particular stress.*

(*b*) *Labour.* If the raw material problems of the next few years be overcome, however, those of the labour supply will still remain. As we shall see, the acuteness of the labour shortage is likely to vary in different parts of the country in which the lace industry is located, but it may be helpful first to survey the trends of labour supply in the industry as a whole.

The two main sources of information about labour supply are the returns of the Ministry of Labour and National Service of the number of insured workers classified in the lace industry, and the Census of Production, with the similar Import Duties Act Inquiry.† Between 1923 and 1939 the trend of the labour force in the lace industry was downwards (see Chart 4). The numbers of both men and women aged 14 to 64 insured in the lace industry fell slightly between 1923 and 1930, revived a little by 1935 and then began to fall again in the later 'thirties, this time at an increasing rate. The movement of the insured labour force, which includes unemployed as well as employed, is similar to that of the number employed in the industry, as given by the Census of Production and I.D.A.I., which is a valuable check.‡

We mentioned that the downward trend speeded up a little in the later 'thirties. This may well be a reflection of an even more serious problem which is not brought out by the figures for the total labour force, namely its unbalanced age composition.

* See Recommendations 4 and 5.

† Throughout the Report we shall refer to the Census of Production and Import Duties Act statistics as I.D.A.I.

‡ The two sets of figures do not exactly match for various reasons. The discrepancy between total employment estimated from insurance data, and the Census figures, is however, fairly steady.

NUMBER OF WORKERS INSURED IN LACE INDUSTRY (AGED 14-64: 1923-1945). ALSO NUMBERS EMPLOYED AS GIVEN BY CENSUS OF PRODUCTION & I.D.A.I.

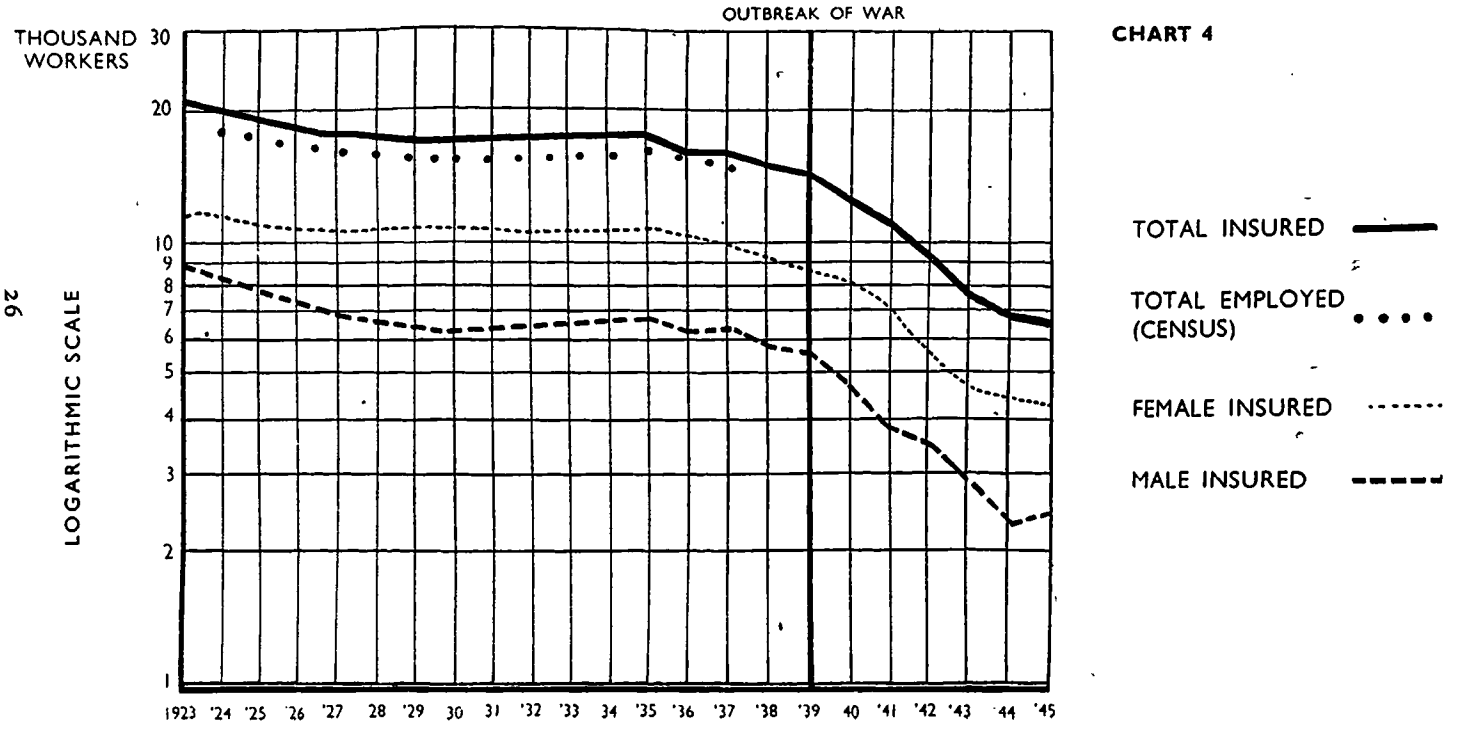


CHART 4

TABLE 2

PROPORTION OF MALES AND FEMALES IN THE THREE AGE GROUPS 14/15, 16/17 AND 18/20 IN THE LACE INDUSTRY, AT VARIOUS DATES

Year	Aged 14/15		Aged 16/17		Aged 18/20	
	Male	Female	Male	Female	Male	Female
1923	—	—	7·3	12·6	—	—
1927	—	—	4·7	11·4	—	—
1930	—	—	6·4	11·8	7·2	13·5
1935	6·1	11·4	4·0	7·2	8·1	12·2
1936	5·4	10·0	5·4	9·2	5·5	10·2
1937	5·9	8·4	6·7	11·8	5·6	8·1
1938	4·5	7·2	6·0	10·0	5·7	11·1
1939	3·5	6·9	5·1	8·8	6·7	13·3
1940	6·2	7·4	5·2	8·0	7·5	13·2
1941	6·5	8·3	5·3	8·4	7·0	11·5
1942	5·8	8·2	5·3	9·8	4·5	9·8
1943	6·0	8·0	6·8	12·1	2·5	9·5
1944	6·7	9·3	6·7	10·7	1·7	11·1
1945	5·0	9·2	7·1	10·9	2·5	12·8

The proportion of both boys and girls aged 14/15 insured in the lace industry fell very sharply from 1935–39. Over a longer period, from 1923–39, the same trend can be seen for juveniles aged 16/17, though here the trend is made up of a very sharp fall 1923–35, with a slight recovery in the later 'thirties. For the young women 18/20, the position shows little change, but the proportion of young men shows a slight decline in the late 'thirties. The figures for the war years do not, of course, tell us very much. The ratio of girls aged 14/15 and 16/17 rose slightly because it proved possible to replace women going into other industries with young girls. This substitution apparently was not possible in the case of men, so that the proportion of boys aged 14/15 and 16/17 hardly rose. The result is that the recruitment in absolute terms of boys during the war years has been at a low level, and this leaves a serious dearth of younger men in the industry at the present time.

To maintain the labour force in any industry in the long run an adequate flow of juveniles must be maintained. We can obtain some idea of the required size of this flow in the following way.

We can estimate the number of new juvenile entrants per year required to maintain a steady population in the industry, assuming that all such juveniles remain in the industry until they are 65, on the basis of the mortality rates of the appropriate year. This will give us an absolute minimum intake required. It is only worth making this estimate for males, because of the net losses of women into marriage before 60. But we are entitled to take the figure for males as a minimum for the lace industry for the industry; as one employing highly skilled men, is more likely to lose adult male workers than to pick them up.

On the basis of the 1937 mortality rates in England and Wales, the minimum annual intake of male juveniles should be 2·24 per cent of the total male labour force aged 16 to 64 inclusive, if that labour force is to keep its size in the long run.*

On this basis we find that in order to maintain a male working population aged 15–64 inclusive, of 6,300 workers, an annual intake of 141 juveniles would be necessary. This is a bare minimum, for if we assume that there is net migration from the industry in later life, a larger number of juveniles would be required. In fact, however, this minimum intake was only just exceeded in the inter-war years, and there are indications that it was too small. We can see this if we look at the problem in a slightly different way, and compare the actual age composition of the male labour force in 1937 (based on a 2 per cent sample analysis), with the proportions which would be needed in the corresponding age group to ensure the maintenance of the population.

TABLE 3

COMPARISON OF PROPORTIONATE AGE DISTRIBUTION OF MALES IN THE LACE INDUSTRY IN 1937 WITH THE 'IDEAL' DISTRIBUTION†

AGE	% of Workers		Surplus + or Deficit −	AGE	% of Workers		Surplus + or Deficit −
	Actual	Ideal			Actual	Ideal	
14/15	5·9	4·37	+1·53	35/39	8·1	10·27	−2·17
16/17	6·7	4·36	+2·34	40/44	7·6	10·02	−2·42
18/20	5·5	6·51	−1·01	45/49	9·4	9·68	−0·28
21/24	8·7	8·59	+0·11	50/54	13·2	9·17	+4·03
25/29	9·4	10·60	−1·20	55/59	7·4	8·48	−1·08
30/34	10·0	10·45	−0·45	60/64	8·1	7·51	+0·59

It will be seen that except for the youths 14/17 and young men 21/24, there was a deficiency in all age groups until we reach the age group 50/54, where there was a substantial surplus over 'ideal' requirements. The position today, nearly 10 years later, is aggravated.

Let us put the problem in absolute numbers. Hitherto we have referred to the labour force, by which we mean the number of workers insured in the lace

* Mortality rates of the year 1937 for England and Wales were used. Thus the difficulties raised by air-raid casualties are evaded. The Scottish mortality rates were a trifle higher, but little was to be gained by allowing either for this, or for further falls in mortality rates in the future, since the resultant difference in the number of juveniles required annually would be negligible. In any case the expected loss of workers from the trade in later life is probably of considerable importance but is most uncertain. For similar reasons, we took mortality rates for all males: we have no reason to expect abnormally high (or low) rates among workers in the lace trade.

In view of the anticipated raising of the school-leaving age, we assumed a male working population aged 15 to 64 inclusive. For the purpose of comparing with pre-war age distributions, however, we assumed a working population aged 14 to 64 inclusive.

† To obtain the 'ideal' proportions of workers in the age groups listed in the table it was necessary to estimate the mortality for each year of age from the Registrar General's data which are given for quinquennial age groups. A rough graphical interpolation was used since the purpose of the above table is not to make precise estimates (the actual distribution is based on a two per cent sample) but to bring out more sharply the nature of the problem.

industry. To give an idea of the present deficiency of labour we shall make a somewhat different comparison, that of employment in 1937 and at 31 March 1946, from data obtained for nearly the whole of the industry in answer to the Working Party questionnaires.*

TABLE 4

EMPLOYMENT OF MALES IN VARIOUS SECTIONS OF THE LACE INDUSTRY IN 1937 AND AT 31 MARCH 1946

	1937	31 March 1946					1946 as % of 1937
		Under 18	18/40	41/65	Over 65	TOTAL	
Leavers . .	1,275	18	110	454	166	748	59
Lace Furnishings .	1,993	94	316	517	166	1,093	55
Plain Net . .	1,476	68	236	557	96	957	65
Embroidery . .	72	3	15	30	3	51	71
Finishers . .	338	11	41	143	38	233	69
Dyers and Dressers	1,213	28	134	214	35	411	34
TOTAL	6,367	222	852	1,915	504	3,493	55

In 1937 the six sections of the lace industry enumerated above—covering nearly the whole of the lace trade—employed 6,367 males. This compares with 6,300 males *insured* in all sections under the Unemployment Insurance Act. The former figure includes non-insured persons, e.g. working proprietors, etc., but excludes certain minor sections of the trade and unemployed. Employment at 31 March 1946 was 3,493, or 55 per cent of the 1937 figure. We shall now put the question: What would be needed, not merely to restore, but to *maintain* a total employment of 6,300 males, assuming that (*a*) the age of entry is 15, and (*b*) male workers retire at 65. This 'ideal' labour force is computed by the method described above.

TABLE 5

MALE LABOUR DEFICIENCY AT 31 MARCH 1946

AGE	15/17	18/40	41/65	Over 65	Total
'Ideal' labour force .	422	3,120	2,758	—	6,300
Actual numbers employed at 31 March 1946 . . .	222	852	1,915	504	3,493
DEFICIENCY . .	200	2,268	843	—	2,807

* The figures for the Lace Furnishings section are for 18 June 1946 and for the Embroidery section 31 May 1946. The differences are probably not large.

The comparison is, of course, unduly unfavourable since, in the course of the year men have continued to return from the Services and war industries: this affects almost entirely the age group 18/40. On the other hand, it is still uncertain how many over 65 will, despite the recent improvements in retirement pensions, in the longer run remain at work. Also the comparison of the age group 15/17 is too favourable since the 31 March 1946 figure includes boys of 14. Indeed, to maintain a labour force of 6,300 in the long run an *annual* intake of 140 boys is required, and this makes no allowance for loss to the industry by net emigration to other industries in later life. The table above brings out very sharply the fact that even if the intake of juveniles is raised *at once* to 140 a year, substantial adult recruitment would be needed to bring the labour force up to full strength. We estimate that failing such adult recruitment, and excluding the returning Servicemen, etc., the labour force would decline slowly but certainly for many years to come.

We must now consider the prospects of building up the labour force in the lace industry.

TABLE 6

NUMBER OF PERSONS INSURED IN THE LACE INDUSTRY 1935–45 AT JULY OF EACH YEAR

Year	Age 14/15		Age 16/17		Age 18/20		Age 21/64		Totals		Total
	Boys	Girls	Boys	Girls	Men	Women	Men	Women	Men	Women	
1935*	410	1,240	270	780	540	1,330	5,480	7,550	6,700	10,900	17,600
1936	330	1,020	330	930	340	1,030	5,160	7,160	6,160	10,140	16,300
1937	370	840	420	1,170	350	960	5,160	6,960	6,300	9,930	16,230
1938	270	650	360	910	340	1,020	5,000	6,500	5,970	9,080	15,050
1939	200	600	290	760	380	1,150	4,780	6,150	5,650	8,660	14,310
								Age 21/59			
1940†	300	600	250	650	360	1,070	3,900	5,760	4,810	8,080	12,890
1941‡	260	570	210	590	280	810	3,230	5,080	3,980	7,050	11,030
1942	210	460	190	550	160	550	3,030	4,040	3,590	5,600	9,190
1943	170	370	190	560	70	440	2,380	3,260	2,810	4,630	7,440
1944	160	410	160	470	40	490	2,020	3,030	2,380	4,400	6,780
1945	120	390	170	460	60	540	2,060	2,830	2,410	4,220	6,630

Source: Ministry of Labour and National Service.

* Juveniles under the age of 16 years first became insurable in September 1934, and estimates of the numbers insured are not available before July 1935.

† Women aged 60 years and over ceased to be insurable against unemployment at 1 July 1940, under the provisions of the Old Age and Widows' Pensions Act 1940, which lowered to 60 the age at which old age pensions became payable to women. It is estimated that 240 women aged 60 and under 65 in the lace industry in Great Britain ceased to be insurable at 1 July 1940, as a result of the lowering of the age limit.

‡ In September 1940 the scope of the Unemployment Insurance Scheme was extended to include non-manual workers with a rate of remuneration exceeding £250 but not exceeding £420 a year. It is estimated that the numbers of non-manual workers with a rate of remuneration exceeding £250 but not exceeding £420 a year included in the figures for July 1941 were 140 men and Nil women.

The Prospects of Rebuilding the Labour Force

The labour position in the lace industry as a whole can be summed up in Tables 6 and 7. Table 6 shows the numbers insured in the industry since 1935 (see also Chart 4), Table 7 the distribution of the insured population by Regions in 1939 and 1945. The distribution by sections of the industry in 1937 and at 31 March 1946, is in Table 4.

TABLE 7

INSURED POPULATION IN THE LACE INDUSTRY BY REGIONS*
1939 AND 1945

	1939					1945				
	Men	Boys	Women	Girls	Total	Men	Boys	Women	Girls	Total
East and West Ridings	10	—	—	—	10	—	—	—	—	—
Eastern Region	—	—	—	—	—	—	—	—	—	—
London and South-Eastern Region	40	—	60	20	120	—	—	10	—	10
Midland Region	20	—	20	—	40	—	—	20	—	20
North Midlands Region	3,270	260	5,040	800	9,370	1,200	140	2,190	610	4,140
Northern Region	—	—	—	—	—	—	—	—	—	—
North-Western Region	—	—	—	—	—	—	—	10	—	10
Scotland Region	1,250	120	1,580	340	3,290	420	100	680	150	1,350
Southern Region	10	—	40	20	70	—	—	—	—	—
South-Western Region	560	110	560	180	1,410	500	50	460	90	1,100
Wales Region	—	—	—	—	—	—	—	—	—	—
TOTALS	5,160	490	7,300	1,360	14,310	2,120	290	3,370	850	6,630

Source: Ministry of Labour and National Service.

The position for the industry as a whole is that in July 1945 the number of insured workers was just about half of 1936–38. In March 1946 the position estimated on a different basis was that employment was 55 per cent of 1937. The position may, no doubt, be somewhat eased as demobilization continues and as the full effects of the relaxing of Essential Work Orders come into play. But what are the longer term prospects of recovery? The situation varies from region to region: in particular the position in Scotland is quite different from elsewhere. Accordingly we shall examine separately each of the principal regions. We are indebted to the Ministry of Labour and National Service, and in particular to the Regional Offices in Edinburgh, Nottingham and Bristol, for putting before us valuable memoranda, which are heavily drawn upon in the following paragraphs.

* The Lace Industry, as defined by the Ministry of Labour and National Service, includes one or two processes, e.g. Madras manufacture, which do not come within our province.

The Scottish Area

Nearly the whole of the Scottish section of the lace industry (mainly the Lace Furnishings section) is concentrated in three small towns, Newmilns, Darvel and Galston, and is the main industry in the area. In the Newmilns employment area in 1939 just under a half of the 5,000 insured workers were in the lace industry.* The proportion of lace workers had fallen to just under a third in 1945, the relative fall being due mainly to the development of the war factories in the area. With the return of workers from the Services and the war factories there was, to begin with, considerable unemployment in the Newmilns area—12·8 per cent in August 1946. The continuation of this unemployment depends in the short run entirely on the supplies of yarn to the lace manufacturers. In the longer run, some development of competing industries in, or near, the area may occur, since it has been scheduled by the Board of Trade for development. The Ministry of Labour and National Service estimated that the total adult population in 1948 should not fall short of the 1939 level by more than 400 men and 100 women. On this basis the number available for employment in the lace industry, in addition to juveniles, should approximate to 820 men and 1,270 women. Allowing for the juveniles, we may say that the 1948 labour force in lace might be well over 90 per cent of the 1939 level.

If the yarn can be found, the Scottish labour position looks fairly satisfactory, though even here, if our projected *expansion* in output over pre-war is to be achieved, a definite increase in output per man-hour must be sought. Moreover, it is clear that in a few years the industry must expect increasing competition for labour from other industries which are encouraged to develop in or near the area.

The North Midlands Area

In 1939 two out of three workers in the lace industry were in the North Midlands Region. But while the bulk of the lace industry is still in and around Nottingham, the share of lace in industry as a whole is, in strong contrast to the Newmilns area, small. In those parts of the North Midlands Region where there was any lace at all,† lace workers constituted 2·8 per cent of all insured workers in 1939: and this share had fallen to 1·3 per cent in 1945. In Nottingham itself the share was rather higher; 4·3 per cent and 2·4 per cent respectively. But only in the small town of Southwell, and in Long Eaton, was a share of more than 10 per cent to be found before the war. In fact, the 1,535 workers in Long Eaton, constituting 12·3 per cent of the 1939 insured population of that town, formed the largest concentration of lace workers outside Nottingham itself (4,893) and the Newmilns area (about 2,300). Moreover, by 1945 the *share* of lace had fallen in every centre. Thus the lace industry will have to compete for labour with many other, and several much larger and more up-to-date industries. The Ministry of Labour and National Service has made estimates of the prospective labour deficit in all industries in 1948 both for the North Midlands Region and also for the lace areas of the region. For the former, a deficiency of 27,000 men

* The Ministry of Labour's classification of Lace workers includes those engaged in making certain types of woven nets. For our purpose we have excluded them.

† The area concerned is covered by the local Employment Offices of Alfreton, Arnold, Basford, Beeston, Derby, Heanor, Hucknall, Ilkeston, Long Eaton, Loughborough, Netherfield, Nottingham, Ruddington, Southwell.

and 20,000 women, 47,000 in all, is anticipated in 1948: and for the lace areas alone a deficiency of 5,000 workers is expected. These deficiencies are respectively 5·07 and 1·74 per cent of the total adult labour in the region and in the lace areas of the region. There is hardly a single one of the 90 Employment Offices in the region which does not anticipate some deficit.

These estimates are very tentative and based on many assumptions which may not work out in the event. The Ministry of Labour and National Service has itself had to make some estimate of the labour requirements of each industry, including, of course, lace. But it is significant that in the Nottingham area in which there were 5,000 lace workers insured in 1939, the Ministry of Labour and National Service allow for an employment of only 3,000. If lace were to obtain more workers than 3,000, it would only do so by aggravating the deficiency in other industries.

In short, the Ministry of Labour and National Service, estimating on what appear to be conservative lines, takes the view that a prolonged labour shortage in the area must be expected. Some relief may come, of course, from firms in the area migrating or setting up parts of their enterprise in other areas where the shortage is less acute, and the Regional Controller of the Board of Trade informed us that the movement in this direction is significant. On the other hand, it must be borne in mind that many of the workers, especially women, who left the lace industry during the war, have now acquired various degrees of skill in engineering and other industries, and may prefer to remain where they are rather than return to lace.

To attempt to predict the number of lace workers in two or three years time is obviously hazardous. To a great extent the number will depend on the steps taken by the lace industry itself to improve wages, working conditions and welfare. Such steps may inevitably be somewhat slow in countering the reluctance to enter the trade based upon past misfortunes, and the fact that some sections of the lace trade are 'dirty' owing to the use of black lead (graphite) as a lubricant in the major machine-holding sections of the industry.

After careful consideration of the material presented to us, we take the view that, in the absence of any *relative* improvement as compared with other industries, the labour force in the lace trade in the North Midlands Region is not likely to return to more than 75 per cent of the pre-war numbers; even this may well involve the training of a substantial number of adults new to the trade.

TABLE 8

INSURED POPULATION IN THE LACE INDUSTRY IN THE SOUTH-WEST

	1939		1945	
	Nos. of Insured Persons Engaged in Lace Industry	% of Total Insured Population	Nos. of Insured Persons Engaged in Lace Industry	% of Total Insured Population
Barnstaple .	194	2·5	176	2·5
Chard . .	358	14·2	261	10·4
Tiverton .	832	24·0	619	17·0
TOTALS	1,384		1,056	

The South-Western Area

The position in Barnstaple, Chard and Tiverton is rather the same as in the North Midlands Area. (see Table 8).

In 1945 the lace labour force was 76 per cent of the 1939 level. A further improvement is to be expected, but a full restoration is unlikely. The total insured population is likely to remain rather below pre-war: meanwhile, increasing competition must be encountered from industries which have developed during the war and may be expected to remain. In Chard, the numbers insured in engineering rose from 314 in 1939 to 791 in 1945: in Tiverton, the one firm making lace is competing with itself, having expanded the manufacture of woven textiles during the war: in Barnstaple, National Government Service is likely to remain above its pre-war level. A return to 85 per cent of pre-war for the South-Western Region is thus a fairly optimistic estimate.

The Need to Increase Productivity

For the country as a whole, we suggest that a return to about 80 per cent of the insured population of 1939, which means just under 75 per cent of the labour force of 1936–38, is the most which can be expected *in the absence of special measures*. What does this mean? It means that the demand which we anticipate will exist for lace products could be met if either (*a*) output per worker in the industry as a whole, whether employed or not, could be increased by 50 per cent over the pre-war level, or (*b*) such inducements could be offered by the various sections of the lace industry to attract, against acute competition from other industries, sufficient additional workers. The reduction of unemployment in the industry to a very low level will, of course, go part way towards closing the gap, but it will still remain necessary to raise the productivity per worker employed by something of the order of 30 per cent, assuming the labour force is restored to 75 per cent of pre-war.

In fact, higher productivity and the attraction of recruits go hand in hand. *If* the lace industry can raise its productivity it will be able the more easily to afford the higher wages and the expenditure upon such improvements as lighting and welfare, which can make it as attractive an industry as any other in its neighbourhood.

These estimates and forecasts of both demand and labour supply are, we are well aware, very uncertain, and can be criticized in a great many details. But we are convinced that the broad picture which emerges is as fair a guess about future trends as can reasonably be made. Moreover, we feel strongly that the industry will gain by setting before itself definite targets. If a concerted drive is made to raise the output per worker employed by 30 per cent in the next five years, and to use the greatly increased returns which would result to undertake the many other improvements which we recommend, then the industry will be able to face any competition which may be experienced from abroad with confidence, and may be sure that it will no longer have to fear the consequences of a steadily diminishing labour force.

We have accordingly given much attention to measures designed to attract the largest labour force available in the circumstances and to make the best use of it. Our proposals under this head are concerned with (*a*) the improvement of working conditions, (*b*) technical developments of a labour-saving kind. (*c*) the most economic use of the labour available.

The problems which seem to us most urgently to require solution can, therefore, be summed up in the following terms:

(1) Those concerned with ensuring the most favourable general conditions for the expansion of trade.

(2) Those concerned with the means of strengthening the industry's competitive power by improvements in organization and technique.

(3) Those arising from the threatened shortage of raw materials.

(4) Those arising from the threatened shortage of labour.

It has seemed most convenient to arrange the report on a sectional basis with special chapters devoted to problems common to all sections alike. The recommendations are, where necessary, arranged in a similar manner but are grouped under general headings.

(*Footnote to page* 15).

*The standard account of the earlier years of the industry is in William Felkin *History of the Machine-Wrought Hosiery and Lace Manufactures*, 1867. H. Henon *L'Industrie des Tulles et Dentelles Mécaniques dans le Departement du Pas-de-Calais* 1815-1900, Paris 1900, also contains much of interest in a study of the English Industry. *The U.S. Tariff Commission Report*, 1934: *Laces and Lace Articles* (*No.* 83, *2nd series*) is the only recent full scale study of the industry; and, though primarily a study of the United States industry, it embodies much information on that of the United Kingdom and other lace-producing countries. *Studies in Industrial Organisation*, edited for the Nuffield College Social Reconstruction Survey by H. A. Silverman (London, 1946), contains a study of the lace industry by Dr. F. A. Wells. The *Short Survey of the Lace Industry*, prepared by Professor W. Davis at the request of the Federation of Lace and Embroidery Employers' Associations, is also useful on questions concerning production.

PART II. Analysis of the Industry

CHAPTER III. THE LEAVERS MACHINE-HOLDING SECTION

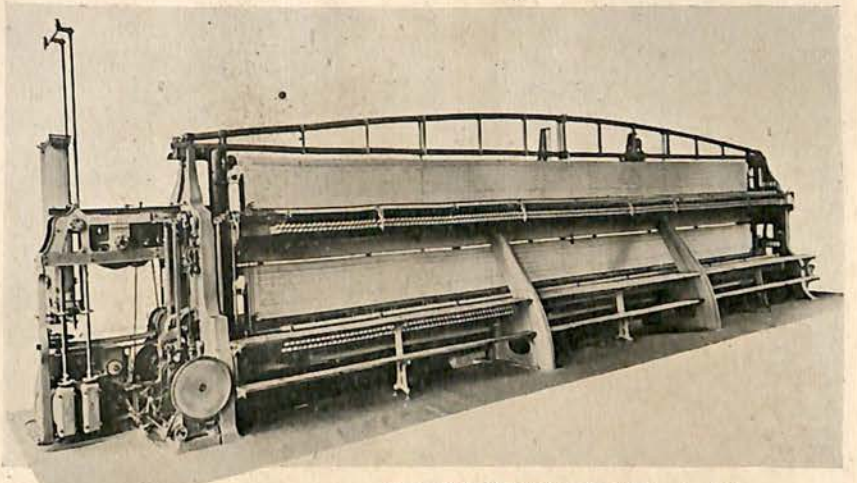
I. INTRODUCTION

THE products of the Leavers lace machine are traditionally dress laces including lingerie laces, veilings and hair-nets; in recent years a very considerable production of the latter has been developed. There is also some production of furnishing laces. As their names suggest, many of the laces are imitations of well-known hand-made laces such as Valenciennes, Cluny, Alençon and Chantilly. The versatility of the machines is such that only an expert can distinguish easily between the finer machine products and the original hand-made lace. Not all designs are copies of hand-made laces: on the contrary, many entirely new designs are created, and considerable efforts are always being made to develop new and distinctive styles and designs. The dress laces are produced in various forms. Some are specifically for trimming purposes and may be narrow and medium breadth bands (edgings and insertions) from one-quarter of an inch to almost any width up to 36 inches. In the case of the narrow laces a large number are produced simultaneously in one webbing on the machine and are separated at the finishing stage by withdrawing the drawthreads linking together contiguous bands. These trimming laces are largely used for dresses, neckwear, lingerie, millinery and napery purposes. Much of the dress lace is now used as a material or fabric constituting the main basis of the article produced. This is made in the form of 'all-over' nets or flounces. All-over nets can be, and often are, produced the full width of the machine on which they are made. These form the material from which are made such things as blouses, gowns, underwear, fancy table linen, curtain nets, etc. Flouncings are generally made 36 inches in width and have a scalloped edge at the bottom of the breadth. These are used mainly for dinner dresses and evening gowns. Some considerable use is also made of laces, all-over nets and flouncings as material from which motifs can be cut for use as decorative appliqué or other material. Veilings—light fancy open nets—for use as face veils and also much used as a decoration for hats—and hair-nets, setting nets and slumber nets, are other examples of the products of the Leavers machine.

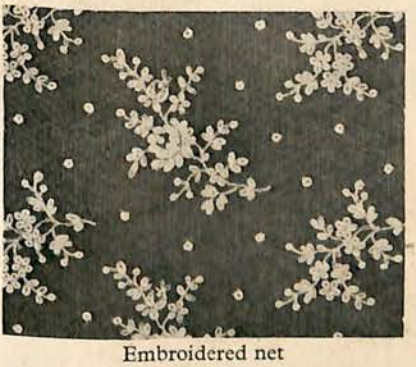
The Leavers machine-holders were originally established in Nottingham, but later they spread into the surrounding area, going as far as Derby. At present the highest concentration of machine-holders is to be found in Long Eaton, about seven miles from the centre of Nottingham.

One of the outstanding features of the Leavers section of the lace trade is the sharp division of function between the machine-holders and the finishers, who purchase the lace webbing in the brown state from the machine-holders.*

* We discuss the reasons for this division in Chapter X.



Automatic Schiffli embroidery machine



Embroidered net

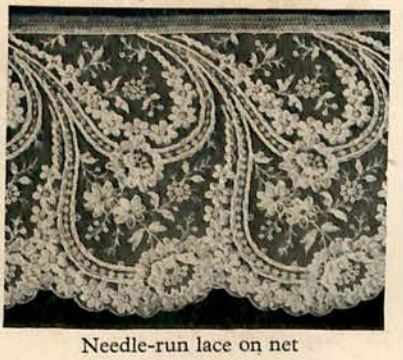
Embroidered galon

Needle-run 'cut-out' lace

Guipure all-over

Guipure edging

Guipure edging



Needle-run lace on net

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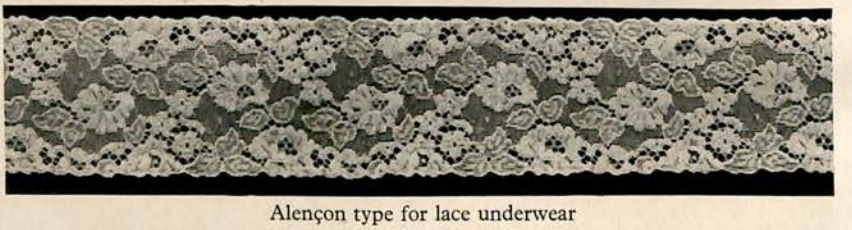
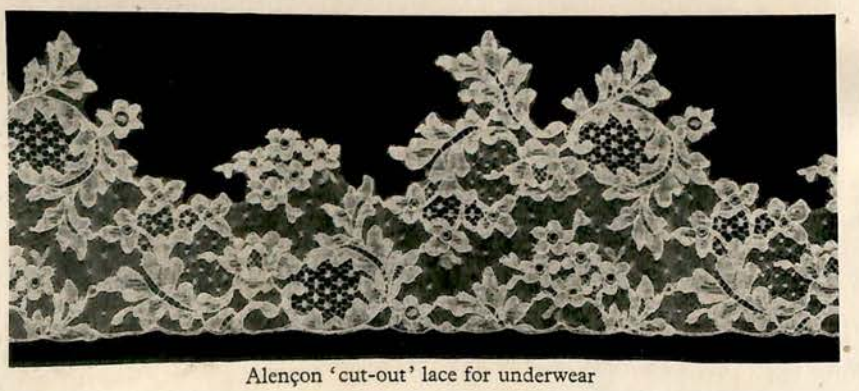
Leavers lace machine



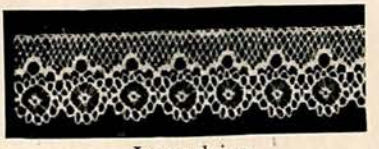
Alençon type for lace underwear



Alençon 'cut-out' lace for underwear

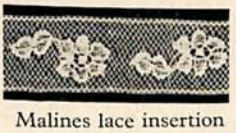
MORE PRODUCTS OF THE LEAVERS LACE MACHINE

Silk and rayon dress flouncing



Lace edging

Baby Irish edging

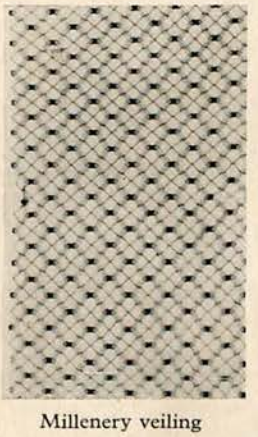


Malines lace insertion

Valenciennes edging
(reproducing real lace)

Chantilly lace flouncing

Silk and rayon dress flouncing

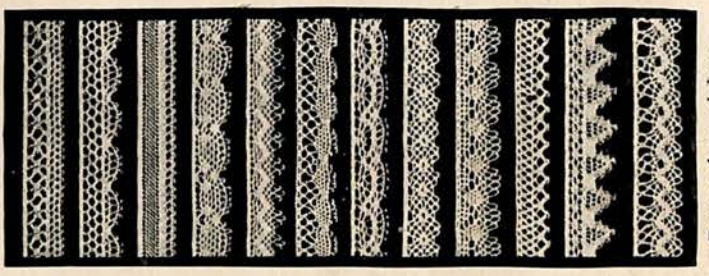


Millenery veiling

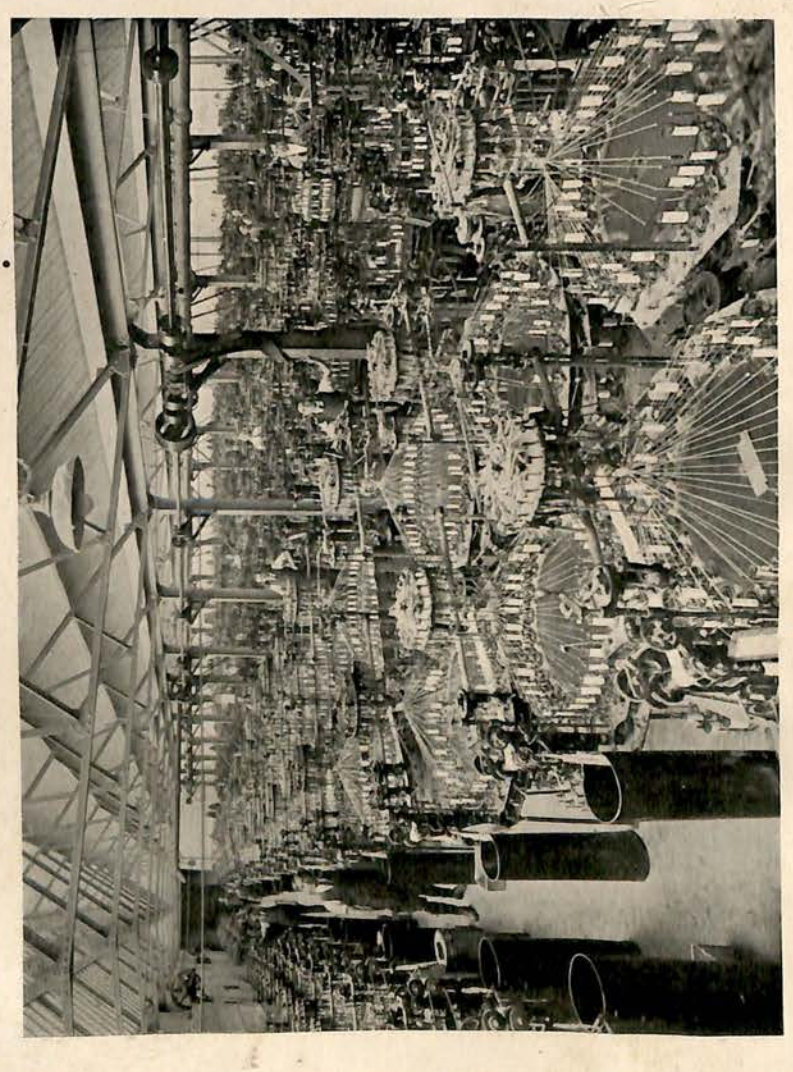
Alençon all-over

Point de Paris edging

Valenciennes edging



Barmen lace edgings



Barmen lace machines

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II. THE STRUCTURE OF THE SECTION*

(a) *Production*

Owing to the violence of the slumps which the Leavers section has encountered in the last 40 years, an accurate statistical record of the section is difficult to obtain. In 1908–10 there were 220 machine-holding firms with 2,500 machines. During and immediately after the war of 1914–18 there came a sharp change in fashion: in addition certain important markets, such as the Russian luxury market, were lost. As a result, many firms went out of business; there were at least 131 machine-holders in 1923, but only 75 in 1946. Many businesses also changed hands during this period and many machines were sold from one firm to another. Thus, data for the year 1923 collected from present machine-holders would have proved of little use. The Midland Counties Lace Manufacturers' Association, who provided the information sought in the Working Party questionnaire, accordingly made use of data collected during 1923 in connection with the inquiry into the causes of unemployment in the machine-made lace and embroidery industry, and it is probable that the numbers of firms and machines for the year 1923 are both understated.

The typical Leavers machine-holding firm has only one establishment. The number of firms was reduced between 1923 and 1937 by at least 35 per cent, and a further reduction of 12 per cent has been brought about by the recent war.

TABLE 9

NUMBER OF FIRMS AND ESTABLISHMENTS IN THE LEAVERS MACHINE-HOLDING SECTION†

	1923 In Operation	1937 In Operation	1946 In Operation	1946 Closed owing to war conditions, but likely to reopen
Firms . .	131	85	67	8
Establishments	Not known	89	72	8

* Statistics of the lace industry are very scanty. At the first meeting, members of the Working Party criticized the figures contained in the Census of Production and in the Import Duties Act Inquiries. The main objections to these data refer to: (i) the lumping together of all sections of the trade, both horizontally (e.g. Leavers, plain net) and vertically (e.g. machine-holders, and finishers) when they are not in fact comparable; (ii) the faulty classification of products; (iii) the amount of double counting in the value of production, caused by including both machine-holders and finishers. Accordingly, it was decided to attempt to obtain from the Trade Associations data for the separate sections, mainly for the year 1937. At the same time, the Board of Trade re-sorted the returns of the 1937 I.D.A.I., and was able to give us some information about the separate sections. There are discrepancies between the figures obtained from the two sources, and it will be as well to refer to the main differences when they occur.

† The Working Party questionnaire gives 85 firms with 89 establishments in 1937, with a net selling value (value in the brown) of £978,000. The I.D.A.I. of 1937 gives 61 establishments, with a gross output of £896,000. 'Gross output' and 'net selling value in the brown' are identical concepts. The difference of 24 establishments is almost completely accounted for by the exclusion from I.D.A.I. of establishments in which less than 11 operatives were employed.

Of the 85 firms in operation in 1937, all but five sold lace in the brown to the finishers. There were two 'vertical' firms (i.e. both lace production and finishing were undertaken by the same firm) which sold to wholesalers, makers-up and export, and three 'vertical' firms which sold to retailers, makers-up and export. All five vertical firms procured dressing on commission; two of these five were hair-net manufacturers.

III. THE MACHINES

We asked for a census of machinery in the years 1923, 1937 and 1946. 1923 was chosen as a base year for two reasons: (1) the collapse in the demand for Leavers lace products was over, and the demand more or less stabilized (subject, of course, to the usual year-to-year fluctuations) on a new and lower level; (2) it was anticipated that inquiries about the year 1923 made to firms in existence at present would produce little result and that the data prepared for the inquiry of the Lace and Embroidery Committee would probably have to be used. In the event this proved to be the case.

TABLE 10

LEAVERS LACE MACHINERY, 1923, 1937 AND 1946*

(1) Number of machines in 1923†	1,373
(2) Number scrapped, destroyed or sold overseas since 1923‡	510
(3) Number of machines in (1) which have since been reconditioned	Not known
(4) Number of new machines erected since 1923 to replace (2)	None
(5) Number of new machines erected in addition to (4)	None
(6) Number of machines standing that have not been used since 1927	About 50
(7) Number of machines in 1937	897
(8) Number of machines in 1946	863

The number of machines in existence in the trade fell between 1923 and 1937 by 35 per cent, and by a further 4 per cent during the recent war. No new machines whatsoever have been installed since 1923. The number of machines which were fully reconditioned is not known, and in any case this information is particularly difficult to obtain, owing to the problem of drawing the line between ordinary care and maintenance and the replacement of the many parts on such a scale as would amount to the construction of a new machine.

*The statistics relating to 1937 in relation to both manpower and machines were obtained from a questionnaire issued to its members by the Midland Counties Lace Manufacturers' Association. Of 73 questionnaire issued, 61 were returned. The manpower and other data given here are based on the 61 returns built up with other factual evidence: when the latter was lacking, the figures have been expanded proportionally.

†As explained in the text, the figures here may be understated; item (2) is a residual, the difference between (1) and (8), and may therefore also be understated.

‡ Of the 500 or more machines which have gone out of the trade, it may well be that 70 per cent have been scrapped and the remaining 30 per cent sold overseas. No account has been taken of machines which have reverted to machine builders and remain in their stocks.

That no new machines at all have been installed since 1923 is at first sight startling. The following comments may, however, help to complete the picture of the present position:

(i) There is nothing sacrosanct about the newness of the frame of a lace machine. If new bobbins and carriages, new combs, rollers and bars, cams and a new jacquard apparatus are installed, the result is the equivalent of an entirely new machine. Some such full reconditioning has occurred, but its extent is not known.

(ii) In the process of contraction, the industry as a whole disposed of the older machines, the surviving firms buying in at second-hand the best machines of the firms going out of business to replace their own oldest machines. We have no statistical evidence as to the extent of this concentration upon the best machines. But we do know that the composition of the machine pool was changing. For example, there has been a tendency to dispose of the extremely fine and the extremely coarse gauge machinery (see Table 11).

TABLE 11

GAUGES* OF LEAVERS MACHINES 1923, 1937 AND 1946

(Number and Percentage of Machines)

Gauge		4½, 5¼ & 7	9	9½, 10 & 10½	11 & 12	13 & 14	15 & 16	Total
1923	No.	93	152	901	144	75	8	1,373
	%	6·7	11·1	65·5	10·5	5·5	0·6	100
1937	No.	56	64	670	59	42	6	897
	%	6·2	7·3	74·6	6·6	4·7	0·7	100
1946	No.	53	60	643	59	42	6	863
	%	6·1	6·9	74·5	6·8	4·9	0·7	100

The proportion of machines of 9½-, 10-and 10½- point gauge has risen from just under two-thirds in 1923 to just under three-quarters in 1946.

A similar reduction in the extreme widths is to be observed (see Table 12).

TABLE 12

WIDTHS OF LEAVERS MACHINES 1923, 1937 AND 1946, IN INCHES†

(Number of Machines)

Width in Inches	146	147/70	171/180	181/200	201/216	216+	Total
1923	242	128	315	443	72	173	1,373
1937	20	38	297	329	119	94	897
1946	14	32	288	322	113	94	863

* The gauge of a Leavers machine is the number of points or carriages to the half-inch.

† It is clear from the table that in 1923 either the number in the group 201/16 is understated, or else some of the machines in the groups immediately higher and lower should be included in this group. The total numbers of machines in the central width range of 171 inches to 216 inches inclusive was 830 in 1923, 745 in 1937, and 723 in 1946.

There is a fall of 13 per cent between 1923 and 1946 in the number of machines in the central width range of 171 inches to 216 inches inclusive. Machines narrower than 170 inches have almost disappeared: 46 in 1946 against 370 in 1923. The reduction in the wider machines, greater than 216 inches, is also large, over 45 per cent. Since the greater number of machines leaving the trade were narrow, the average width of the remaining machines has naturally risen. A rough calculation gives the average width in 1923 and 1946 as 180 and 188 inches respectively: the increase over the period being 4½ per cent. The number of widths extant has been much reduced, being now less than a dozen. Moreover, at present, the 288 machines of 176 inches, the 322 of 186 inches, and the 113 of 202 inches between them amount to over four-fifths of all the machines.

The changes in gauge and width outlined above are not conclusive evidence of concentration upon the most modern of the machines extant in 1923, but as a rule the narrower the machine the older it was. In addition members of the trade gave evidence of this concentration from their own experience.

(iii) As a rule the Leavers machines are driven by belts from a common source. This is usually the case in the tenement factories. In terms of general convenience, if not always in cost, the individual electric motor drive seems to be better (cf. the Lace Furnishings section, p. 53). In 1937, 76 of the 897 machines had individual motors: in 1946, 92 of the 863 machines had such motors. No figures are available for 1923. *

These comments undoubtedly confirm the view that the thinning-down process was accompanied by an improvement in the *average* machine in use. It was hardly to be expected that the section should indulge in massive modernization under the impact of successive slumps since 1918; it would not have been very sound policy, nor was it financially possible. Nevertheless the complete cessation since 1923 of purchases of new machinery is disturbing, for a vicious circle is created. If new machines are not being bought, then little or no research will be undertaken by machine builders into possible technical improvements. And without these improvements, the familiar argument that the old machines are as good as the new must carry with it a substantial element of truth. It is to be hoped that the Leavers section will consider the possibility of taking a few new machines annually, as an essential part of reviving the technical progress which was so marked a feature of the early history of the lace machine.

IV. MANPOWER

The Leavers machine-holding section employed altogether 2,245 workers in 1937: this means an average establishment of 25 workers (including managers and working proprietors). The section was severely contracted during the war, and by 31 March 1946 employment had reached only 1,142, just over half the pre-war figures. Further expansion is being rendered difficult because of the yarn shortage. The disproportion between men and women employed in 1946 is probably temporary: firms are obliged to re-employ ex-servicemen, whether or not there is enough work for them to do. The drastic fall in employment of designers, draughtsmen and card punchers is, however, more serious, and we refer to this elsewhere in this report (pp. 125–7).

* Some of the machines sold since 1923 were electrically driven.

We were unable to obtain the age composition of the labour force in 1937. Data for 1946 must, of course, be treated with caution since they reflect an abnormal situation. Even when allowance is made, however, for men still serving in the Forces the position appears disquieting.

The manpower position in the Leavers machine-holding section is shown in Tables 13 and 14.

TABLE 13

EMPLOYMENT IN THE LEAVERS MACHINE-HOLDING SECTION 1937 AND 1946*

Occupation	MALE			FEMALE		
	1937	1946	1946 as % of 1937	1937	1946	1946 as % of 1937
1. Twisthands	751	442	*59*	—	—	—
2. Auxiliary Workers	277	174	*65*	911	376	*41*
3. Factory Office Staff	33	20	*61*	37	18	*49*
4. Designers, draughtsmen, and card punchers	109	18	*17*	17	—	—
5. Office and sales Staff (including working proprietors, managers, directors and departmental managers; excluding staff entered under item 3)	105	94	*90*	5	—	—
Totals	1,275	748	*59*	970	394	*41*

TABLE 14

AGES OF EMPLOYEES† IN THE LEAVERS MACHINE-HOLDING SECTION AT 31 MARCH 1946

	MALE					FEMALE				
	Under 18	18/40	41/65	Over 65	Total	Under 18	18/40	41/60	Over 60	Total
No.	18	110	454	166	748	25	96	218	55	394
%	*2·4*	*14·7*	*60·7*	*22·2*	*100·0*	*6·3*	*24·4*	*55·3*	*14·0*	*100·0*

It is quite clear that if the labour force is to be maintained and expanded, juvenile recruitment alone, however successful in the long run, will not suffice in the next ten years. Substantial adult recruitment will be needed.

* The 1937 figure is an average for the year: 1946 is the number of employees at 31 March. This table does not include commission designers, draughtsmen and card punchers.

† Including managers and working proprietors.

V. RAW MATERIALS

The section's principal material is cotton yarn of the finer counts: in 1937, 1,456,000 lb., costing £191,000, were used. 467,000 lb. of rayon, at a cost of £68,000, and 90,000 lb. of silk yarn, mainly Italian and Japanese, costing £54,000, were the main other materials used. (A small amount of woollen and worsted yarn is included in the cost of silk above.) The total cost of all other materials, excluding fuel, but including items such as packing and jacquard cards, was £47,000.

For the period November 1946 to February 1947, yarn allocations adjusted to an annual rate amounted to 830,000 lb. of cotton, of which about one-fifth was for utility curtain nets for the home market, and the remainder for export goods, and 345,000 lb. of rayon for lace for export and for hair-nets for home and export. The current allocations represent slightly over half for cotton and three-quarters for rayon of the 1937 consumption.* In addition, some silk is now available, but is not subject to allocation. No wool was being allocated at the end of 1946.

VI. ANALYSIS OF THE SECTION

Most Leavers machine-holding firms are very small. Well over half the firms have less than ten machines. In 1937 firms with up to five machines had on the average one proprietor and ten operatives; those with five to ten machines one proprietor and eighteen operatives; the smallest firm had only three machines and three operatives in addition to the proprietor; the largest in the section had 40 to 50 machines and between 100 and 150 operatives including managers, etc.

TABLE 15

SIZE DISTRIBUTION OF LEAVERS MACHINE-HOLDING FIRMS: 1937

Size of firm by number of machines	Up to 5	6–10	11–15	16–20	Over 20	Total
No. of firms . .	22	35	14	4	10	85
No. of machines .	88	264	171	69	305	897
No. of twisthands .	88	223	176	60	204	751
No. of operatives .	243	580	449	151	706	2,129
Turnover (£000)†.	131	323	253	83	189	978
Output (000 Racks)	463	1,140	894	293	667	3,457

The total turnover of the section was £978,000 in 1937: this is the value of lace in the brown, and is not directly comparable with turnover figures for the Lace Furnishings section which are given in terms of prices to the wholesaler. The

* It should be noted both here and in the corresponding paragraphs in the surveys of the other machine-holding sections that these allocations are higher than those for the period early in 1946 to which our labour statistics relate. A direct comparison between 1937 yarn consumption and current allocations is a little misleading, partly because there is an element of estimation in the 1937 figures, and partly because deliveries of yarn against current allocations may not always be made in full and are usually subject to some delay.

† Turnover for the goods has been estimated on the basis of 5s. 7·9d. per rack, which was the average value per rack for the Leavers section.

equivalent 'wholesale' value of the Leavers machine-holding output would have been about £1,750,000. The proportion of exports is believed to have been about 70 to 80 per cent. We were fortunate also in obtaining a measure of physical output—the number of racks produced. The Leavers 'rack' is 1,920 single motions, equivalent to 960 double motions.* The total rack output was 3·3 millions. The length of a 'rack' depends, of course, upon the nature of the work being produced. A very complex pattern with fine texture may require many motions of the bobbins with the webbing virtually stationary. An average rack is probably about 24 inches in length, and the average width of fabric is 180 inches, so that the total output of lace was probably some 11·1 million square yards.†

Efficiency

To attempt to measure efficiency in the production of such a varied product as lace is almost impossible. The weaknesses of the money value of output per twisthand or per operative are well known, while in this case the physical unit—the rack—is far from being a uniform measure. Rack output per operative in terms of hair-nets would obviously be much greater than in terms of fine lace. In comparing groups of firms of different sizes, some of these differences may be smoothed out.

TABLE 16

OUTPUT PER MACHINE, PER TWISTHAND AND PER OPERATIVE IN 1937: ACCORDING TO SIZE OF FIRM

Size of firm by number of machines	Up to 5	6–10	11–15	16–20	Over 20	Average for Section
Turnover in £'s						
(*a*) per machine .	1,488	1,222	1,480	1,201	619	1,090
(*b*) per twisthand	1,488	1,447	1,437	1,381	925	1,302
(*c*) per operative.	539	556	563	549	268	459
Rack Output						
(*a*) per machine .	5,262	4,316	5,227	4,245	2,188	3,854
(*b*) per twisthand	5,262	5,112	5,079	4,882	3,270	4,683
(*c*) per operative.	1,905	1,966	1,991	1,940	945	1,624

Table 16 shows that in all the size groups, except the largest, there is no significant difference in output or turnover, per machine, per operative or per twisthand. It should be emphasized that these figures are *average* for the size groups and that *within* the size groups the range of variation is in some cases astonishingly wide (see Table 17). With all due caution, Table 16 suggests that there

* The plain net and curtain racks are 720 double motions.

† This is the square yardage in the brown. In certain instances the square yardage may be substantially increased during the dressing process. In other instances shrinkage may occur.

TABLE 17

RANGE OF TURNOVER (IN £'S) PER TWISTHAND AND PER MACHINE IN THE VARIOUS SIZE GROUPS IN 1937

Size of firm by number of machines	Up to 5	6–10	11–15	16–20	Over 20
Turnover per twisthand					
Minimum . .	386	350	1,065	1,078	Nominal
Maximum . .	2,546	2,359	1,741	1,891	1,506
Average . . .	1,488	1,447	1,436	1,381	925
Turnover per operative					
Minimum . .	143	129	421	410	Nominal
Maximum . .	1,018	778	802	800	645
Average . . .	539	556	563	549	268

are no marked differences in efficiency due to size of units for the firms with less than 20 machines. The firms with over 20 stand out in a different category. All the figures for output and turnover per machine or per operative or twisthand, are very much lower than the average for the industry, and *a fortiori* than the average for the 'less than 20 machine' firms. The disproportionately low figures for output per machine is a reflection of the fact that surplus capacity (as measured for example by machines per twisthand) is much greater for the largest firms than for the remainder.

The facts do not point to any definite size of firm as being the most advantageous: they only suggest that beyond 20 machines or so, there are definite disadvantages. But even this may be due to accidental factors, since the number of firms in the group is very small—only 10.*

Surplus Capacity

Lace machines can be, and for economical working should be, worked for more than one shift. In more prosperous days shift working was the rule. In 1937 it was the exception. For the firms with up to 20 machines there was rather less than one twisthand per machine: for the largest firms there were three machines for every two twisthands. The estimated capacity output in 1937—for a 96-hour machine week—is £3·4 million per annum with a total employment of 2,000 male and 1,670 female workers. To reach this output would require more than double the pre-war number of twisthands, and nearly double the other workers. There is not the remotest chance of such full utilization of existing machinery being attained in the foreseeable future. And even allowing for a substantial 'reserve' of machines for flexible working—changes of design and so on—in

* There are indeed five firms in this group which might well be rejected because of special circumstances. But if this is done, the average rack output per twisthand and per operative of the remaining five firms is still well below that of the section as a whole. This does suggest disadvantages for the largest firms. The U.S. Tariff Commission Report No. 83, 1934 (p. 87) asserts: 'The smallest number of machines which can be operated economically is about ten.' There are, however, many differences in the United States situation; for example, all the American firms are vertical.

view of the labour supply position there is bound to be a very substantial excess capacity. We have it on record that at least 50 machines have not been used at all in the last 20 years.

Since a number of factories are seriously overcrowded, firms should gain space by scrapping one or more machines.* Moreover, we also recommend in the case of rebuilding that two or three firms should group together.† Where they do this they should seize the opportunity to select from their combined stock of machinery the best machines for continued operation. The purchase of a few machines might well be financed by the industry for research and training purposes.

VII. COST OF PRODUCTION

We asked for costings in 1937 and 1946 of three types of product: (*a*) very low grade, (*b*) average, (*c*) very high grade.

TABLE 18

AVERAGE SELLING PRICE (IN THE BROWN) OF THREE REPRESENTATIVE LEAVERS PRODUCTS, 1937 AND 1946‡

	1937	1946	Index (1937 = 100)
	pence per rack		
(*a*) Very low grade Rip torchon and radium flouncing	53	140	*264*
(*b*) Average Vals and bobbin fining shape	80	221	*276*
(*c*) Very high grade 14-pt. Val and silk flouncing	102	278	*272*

A separate breakdown of these costs has not been given for each product, but we have an average costing for all the productions of the trade in Table 19.

TABLE 19

PRODUCTION COST PER RACK IN 1937 AND 1946§

	1937 Pence	1946 Pence
1. Cost of yarn	30·59	61·97
2. Cost of labour	20·44	37·44
3. Design and card expenditure	3·89	2·31
4. Direct conversion cost (including drive, light, heat, water, repairs and renewals, mill furnishings, etc.)	2·32	8·42
5. Production and selling overheads and profit	10·66	21·86
Totals	67·90	132·00

* See chapter XIII. † See chapter XIII.

‡ The prices of the articles mentioned in this table and the cost breakdown in Table 19 are the average prices and costs of a sample of products in each of the three classes.

§ The figures for 1937 presented no difficulty as full details of production are available. Those of 1946 were different. There has been no collection of production data which could enable a similar calculation for 1946 to be made.

The 1946 figures have been calculated on the basis of the three groups (a), (b) and (c) represented in Table 18 above, regard being taken to the estimated proportion of each group now being made. A breakdown of the finished price in 1937 of the same products is given in Table 63.

The stability of the ratio of the main items, despite the rise in selling prices of between two and three times since 1937, is remarkable. The increased relative expenditure on item 4 is probably fully accounted for by the making good of renewals, etc., not undertaken during the war. The only other item calling for comment is the very steep fall in item 3: design and jacquard card expenditure. The special problems of designers, draughtsmen and card punchers are discussed elsewhere in this report (pp. 125–7).

The U.S. Tariff Commission Report No. 83 (p. 168) contains some costs data for British bobbin fining laces, and Cluny lace in 1923. We set these down in Table 20 side by side with the average figures for 1937 and 1946.

TABLE 20

PRODUCTION COSTS 1923, 1937, 1946

		Materials	Labour	Manufacturing Expenses	Total
1923	(*a*) Bobbin fining lace	42·32	32·17	25·51	100·00
	(*b*) Cluny lace . .	44·61	37·65	17·74	100·00
1937	Average . . .	45·05	30·11	24·84	100·00
1946	Average . .	46·95	28·36	24·69	100·00

The share of labour costs in conversion costs is rather lower than in 1923. This may well be a reflection of reduced shift working—with the consequent rise in overheads per unit of output.

CHAPTER IV, THE LACE FURNISHINGS OR CURTAIN SECTION

I. INTRODUCTION

THE Lace Furnishings section, traditionally known as the Curtain section, forms a separate branch of the industry; indeed some manufacturers would prefer to regard it as an industry distinct from both the Plain Net and the Leavers sections. There are, of course, a great many similarities in the general methods of production employed by the Lace Furnishings section and other sections of the lace industry. But the differences are equally important.

(1) The Nottingham lace curtain machine is the largest and most expensive of the various types of lace machine now in use which derive from the Heathcoat plain net machine of 1809. Its outstanding peculiarity is the high jacquard, which is on a platform above the machine itself, the jacquard control being transmitted through many hundreds of strings connected with the individual jacks; it is the interposition of these jacks which produces the pattern. As a consequence of the overhead jacquard the machine must be placed in a lofty room: the array of control strings also makes lighting a more difficult problem than in the other sections.

TABLE 21

NUMBER OF FIRMS AND ESTABLISHMENTS

Area	In operation in 1923		In operation in 1937		In operation in 1946 (March 31)		Closed owing to war conditions but likely to re-open	
	Firms	Establishments	Firms	Establishments	Firms	Establishments	Firms	Establishments
Scotland . .	30	30	32	32	31	15	Nil	16
Nottingham . .	28	34	25*	31*	23*	15*	Nil	13
Total . . .	58	64	57	63	54	30	Nil	29

* One Nottingham firm with two establishments in Scotland and one in Nottingham.

(2) While at one extreme the curtain machine, operating without the jacquard, can make a square mesh mosquito or sand-fly netting, and at the other with a jacquard can make some of the laces more commonly made on the Leavers machines, the greater part of its production is distinct from other sections. The Leavers machine in particular has, as a rule, more carriages to the inch, uses finer counts of yarn and makes many varieties of dress laces, including narrow bands of lace between a quarter of an inch and thirty-six inches wide. The curtain machine, using coarser counts can produce an article up to 240 inches wide, the whole of which is covered by an independent pattern. Its main products are lace window furnishings, i.e. nets, brise-bise (curtains to cover the lower part of the window only) and various other household furnishings, bedspreads, table-covers, cushions and chair covers, and other napery. More recently the experiment has been successfully tried of making woollen cellular blankets which contain to a remarkable degree the merits of warmth and lightness.

(3) Economically the Lace Furnishings section is distinct from other sections of the lace industry. There are very few firms which control both curtain machines and other types. Moreover the structure of the Lace Furnishings section differs from the Leavers section, its closest neighbour in other respects, in that 'finishing', which forms a separate layer of the latter section, is largely carried out on commission for the curtain machine-holders in conjunction with dyeing and dressing: the curtain machine-holder does his own merchanting. One firm in Scotland does its own dyeing and dressing, but the remainder follow the common practice of obtaining these services on commission.

(4) While the other sections are predominantly centred in the North Midlands Region, the principal concentration of curtain manufacturing is in the Irvine Valley, Ayrshire. In 1937 the Scottish area had 54 per cent of the machines, 65 per cent of the employment and 67 per cent of the turnover of the Lace Furnishings section. In the Scottish centre there is no other branch of the lace industry: at the same time, the lace industry itself is the major industry in the Irvine valley, giving 46 per cent of the total employment in the area before the war, whereas in the North Midlands the lace industry gives only a small part (between 2 and 4 per cent) of the employment in the areas in which it is located. As we have seen the labour supply is likely to be more favourable in Scotland than in the English sections of the trade.

II. THE STRUCTURE OF THE SECTION

(*a*) *Production*

The Lace Furnishings or Curtain machine-holding section comprised in 1937, some 57 firms, with 63 establishments, employing just over 3,700 workers, with an annual turnover of slightly over £2 million, of which about 27½ per cent was exported.* Nine-tenths of its production could be classified as lace

* *Number of Firms and Establishments in* 1937. I.D.A.I. gives 50 firms with 51 establishments in 1937 in the Lace Furnishings or Curtain section, employing 11 operatives or more. The Working Party questionnaire gives 57 firms and 63 establishments of all sizes. The difference can be attributed to small firms employing less than 11 operatives, and to firms not making returns under I.D.A.I.

Output. I.D.A.I. gives Gross Output at £2,301,000 in 1937; of this £94,000 is the output of Madras curtains. This leaves lace furnishings output of £2.2 million. The Working Party questionnaire gives an annual turnover at wholesale prices (this is nearly the same in this case as Gross Output) of £1,870,000 for 48 firms in the years 1936–40. These 48

window furnishings, the remainder being napery, table covers, bedspreads and so on.*

The number of processes covered by the firms varies, but the typical firms convert the yarn to netting and procure all other processes, bleaching, dyeing, dressing and finishing, on commission.

TABLE 22

CLASSIFICATION OF FIRMS IN 1937 BY PROCESSES UNDERTAKEN

	Scotland	Nottingham
Number of firms which:		
1. Sell in the brown	1	7
2. Sell to wholesale, shipping and makers-up and		
(*a*) convert yarn to netting, procuring all other manufacturing services on commission .	20	9
(*b*) convert yarn to netting, finish and make up, procuring dressing on commission . .	5	1
3. Sell to retail, shipping and makers-up and		
(*a*) convert yarn to netting, procuring all other manufacturing services on commission .	2	6
(*b*) convert yarn to netting, finish and make up, procuring dressing on commission . .	3	2
(*c*) convert yarn to netting, finish, make up and dress	1	nil

The processes of production of the lace webbing are very much the same as in other machine-holding sections of the industry. There is, however, a substantial difference in the deployment of labour in the Scottish and Nottingham areas of the Lace Furnishings section to which we shall refer again pp. 65–7, and there is a greater use in Scotland of machines for mending than in other sections.

(*b*) *Distribution*

The route travelled by the lace furnishings article from machine to final consumer varies. The majority of machine holders procure bleaching, dyeing, dressing and finishing on commission and then sell goods in the finished state to

firms had 626 of the 703 machines. Allowing the same turnover per machine for the firms which did not submit records, we obtain a turnover of £2.1 million. The gap of £100,000 may be accounted for by higher turnover in 1937 than in the average of 1936–40.

Employment. I.D.A.I. gives the total employment in 1937 as 3,958; of this, 200 may be deducted for Madras curtains leaving 3,758. This compares with the Working Party questionnaire figure of 3,709. Neither I.D.A.I. nor the Working Party questionnaire covered the whole of the industry, and the latter excluded a few firms more than the former. The discrepancy is thus seen to be very slight.

* The 1935 Census of Production gives the following information about production of the curtain machine:

	Finished	*Unfinished*
Cotton Lace Curtains	£853,000	£206,000
Other curtain machine cotton products . .	£85,000	£23,000

These figures between them cover rather more than one half of the output of the industry.

wholesalers, retailers or shippers. A small number of firms, however, sell the lace in the brown state (these firms are all in Nottingham except one), either to finishers or to other machine holders, whence the lace furnishings article follows one of the usual tracks to the consumer. We were provided with information, based upon the data of British Lace Furnishings Ltd., wartime concentration corporation of the section, which gives a picture of the variety and relative importance of the different channels of distribution. The information is not quite complete; it applies to 48 firms, containing about 90 per cent of the pre-war manufacturing capacity of the section; the figures quoted are averages for a five-year period 1936 to 1940*.

Direct sales by machine holders of finished goods manufactured by themselves amounted to 82·6 per cent of the total annual turnover of £1,870,000†; 3.9 per cent of turnover was taken by sales by machine holders of finished goods purchased in the brown from other machine holders. (This is the extent of inter-trading.) The missing 13.5 per cent was sales in the brown to non-machine holders (e.g. lace finishers).

The finished article may travel in several directions. It may be destined for export, in which case it may either be a direct export, packed by the machine holder (or for him) and delivered to the port or ship, or through a third party, i.e. delivered country packed to a British house although ultimately destined for export. The division between export and home trade is roughly as follows.

TABLE 23

SALES OF LACE FURNISHINGS PRODUCTS 1936 TO 1940‡

Home Trade	70 to 75 per cent
Direct Export	18 to 21 per cent
Exports through Third Parties	7 to 9 per cent

Direct exports may be sold through many channels; through commission agents domiciled in markets abroad, or in foreign countries with special connections with other markets abroad (e.g. Holland and Netherlands East Indies); through the firms' own travellers; through branches of foreign firms in the United Kingdom; or through British confirming houses. Third party exports may be made by specialist houses such as the Nottingham Exporters, by merchant converters and general shipping houses, or by wholesale merchants who sell both at home and abroad. It is not, unfortunately, possible to say anything about the relative importance of these multifarious channels of export even for the years 1936 to 1940; still less do we know of the way in which the pattern of

* For the purpose of these figures and for the figures obtained in the Working Party questionnaire a 'year' was taken to be the financial year ending in the required calendar year. Thus the year 1936 for a firm whose financial year ended 31 March would be 1 April 1935 to 31 March 1936.

† All turnover figures have been expressed on a common finished basis. Duplication due to inter-trading and inflation of figures by purchases of non-lace products have been eliminated.

‡ We have referred elsewhere to the serious inaccuracies of the Trade Returns. Quite apart from this there is a substantial parcel post in lace furnishings products. Also some sales to wholesalers and makers-up in this country which were classed under home trade undoubtedly found their way abroad in the made-up article. This problem is less acute for the Lace Furnishings than for other sections.

export selling has been changing. Rather more is known about the home trade. Sales in the brown are made to other machine-holders, specialist and general houses. The bulk of the wholesale business is done with normal wholesalers, but certain unknown quantities are sold to factors and commission buying agents who may be acting as agents of large retail department or chain stores.

TABLE 24

METHODS OF SELLING LACE FURNISHINGS PRODUCTS 1936 TO 1940

	Percentage of total sale value	No. of firms	% of firms
Sale value (on finished basis) of 48 machine-holders who sell			
(i) Mainly in the brown . . .	9·0	7	15
(ii) Mainly to wholesale and shipping .	53·5	28	58
(iii) Mainly to retail and shipping .	37·5	13	27

Even allowing for export, Table 24 suggests that direct sales to retail are quite substantial. In periods of depression there seems to be a tendency for some machine-holders to take the initiative in finding customers and to by-pass the wholesaler. Where this happens the machine-holder as a rule soon finds that he has to handle a wider range of goods than he can make on his own machines.

III. THE MACHINES

In our questionnaire, we asked for a census of machinery, in 1923, 1937 and 1946, with further details of the destruction of old, the erection of new, and the reconditioning of machines. The replies are summarized in Table 25.

TABLE 25

MACHINERY IN THE LACE FURNISHINGS SECTION 1923, 1937 AND 1946*

	Scotland	Nottingham	Total
(i) No. of machines in 1923 . .	390	314	704
(ii) No. scrapped or destroyed since 1923	106	84	190
(iii) No. sold overseas since 1923 .	3	1	4
(iv) No. shown in (i) since reconditioned	117	42	159
(v) No. of new machines erected since 1923 to replace (ii) and (iii) .	63	16	79
(vi) No. of new machines erected since 1923 in addition to (v) . .	42	18	60

* In addition to the 314 machines recorded for Nottingham in 1923, it is believed that there were in the possession of one firm 44 machines, about two-thirds of which were curtain machines, which were scrapped at some time before 1937. The firm had by that time also ceased to be machine-holders. It is thought that all these machines were very old

Table 25—contd.

	Scotland	Nottingham	Total
(vii) No. of machines in working order that have not been used since 1927	9	4	13
(viii) No. of machines in working order in 1937	381	322	703
(ix) No. of machines in working order in 1946	383	258	641
(x) No. of machines in store not erected at 31 March 1946 . .	2	11	13
(xi) No. of new machines partly erected or on order at 31 March 1946 .	4	5	9

Between 1923 and 1937 there was hardly any change in the number of machines—a net reduction of nine in Scotland being offset by a net increase of eight in Nottingham. Since 1937 the number of machines in Scotland in working order still remained almost unaltered, but there has been a sharp fall in Nottingham from 322 to 258 between 1937 and 1946.* The changes in the composition of the machine stock were, however, very different in the two centres. In Scotland in 1946 only 161 machines, or 42 per cent of the 1946 stock, are still as they were, subject to normal maintenance, over 20 years ago. Of the 390 machines in existence in 1923, 109 had been destroyed, scrapped or sold overseas, and 117 had been reconditioned. Meanwhile altogether 105 new machines have been erected. Thus the present stock consists of 42 per cent in existence in 1923, 31 per cent reconditioned and 27 per cent 'new' since 1923. In Nottingham, however, replacement was on an altogether lower level. Of the present 258 machines, 182 (71 per cent) are unchanged since 1923, 42 (16 per cent) are reconditioned since 1923, and only 34 (13 per cent) are new—post-1923—models. That is to say, the proportion of Scottish machines, both reconditioned and new, is in each case twice as great as in Nottingham.†

already in 1923 and did not in effect represent any significant contribution to the capacity of the industry. It is also believed that these machines were driven from a common source, and were considerably narrower than the average curtain machine. It would have been possible for us to make a rough guess about the gauges and widths of the machines, and to include them in this and the following totals, and to take them into account in the comparisons of capacity, etc., which are made in the report. But since it is fairly certain that few, if any, of these machines were used after 1923, and in order not to give a spurious accuracy to the figures for widths and gauges for 1923 in Tables 26, 29 and 30 (which are accurate for the 314 machines recorded), we have excluded the 44 machines altogether. Were they to be included the text would need slight modification in one or two places.

There are inevitably some slight errors in these figures, e.g. the number of machines in working order in 1946 is not quite equal to the number of machines in 1923 minus the number scrapped, destroyed or sold overseas, plus the number of new machines erected since 1923.

* There were, however, 11 machines in store but not erected in Nottingham.

† Of the 105 new machines installed in Scotland since 1923, 43 were installed to replace machines destroyed or damaged by fire and water; while of the 34 new machines installed in Nottingham, 7 were to replace destruction and damage by fire and water. But while in the way of modernization Scotland seems to have derived greater benefit from fire and water than Nottingham, even when this factor is discounted, the rate of replacement and investment in new machinery still remains substantially higher in the former area.

The fall in the total number of machines from 704 in 1923 to 641 in 1946—a drop of 9 per cent—does not mean a corresponding fall in productive capacity. The new machines installed have been, as a rule, a good deal wider than the machines which were scrapped or sold overseas (Table 26).

TABLE 26

CAPACITY OF CURTAIN MACHINES IN INCHES OF WIDTH

	Scotland		Nottingham		Total	
	Total	Average width per machine	Total	Average width per machine	Total	Average width per machine
1923	127,827	328	93,484	298	221,311	314
1937	134,134	352	100,542	312	234,676	334
1946	138,276	361	83,463	324	221,739	346

Despite the fall in numbers the capacity in inches of width, which is the more relevant measure, is still slightly over the 1923 capacity. The average increase in width of machine between 1923 and 1946 was 10·2 per cent.

Motive Power. Curtain machines may be driven either by belt from a common source, or by an individual electric motor. The former is, of course, the traditional motive power, and in many cases was provided in tenement factories, all the rooms of which were provided with power and heat from a single source. Since 1923 there has been a steady replacement of belt drive from a common source by individual electric motors (Table 27). The individual electric motor does appear on balance to be superior; certainly it makes the management of the machine easier for the twisthand; the machines run more consistently; the individual motor is safer since the old overhead belts are to some extent a danger in themselves, and can be more dangerous if the twisthand is careless; there is less noise; and the elimination of axles and belts from the roof of the building improves lighting and general appearance. Although we have no detailed costing, we understand that as a rule the electrical drive is cheaper. This, however, would not be the case for a firm already installed in a tenement factory for whom the costs of power from the common source are included in the rent. The tenement factory owner would be unlikely to make an adequate reduction in the rent per standing should a machine-holder decide to instal individual electric motors.

Since 1923, therefore, we witness two processes: a widening of the machines and an increasing use of individual motors to drive them. Tables 28 and 29 show clearly both these processes for the Scottish and Nottingham areas respectively.

The most common width is still between 350 and 400 inches, but the decline in the machines of less than 350 inches and the corresponding increase in the machines greater than 400 are clearly seen.

The gauge of a curtain machine is the number of points or carriages (with as many warp, beam and spool threads) to the inch. The gauges run from the coarser 4 points to the finer 20 points. In the last twenty years a slight tendency towards the coarser gauge machinery can be seen (Table 30). Eight-point

TABLE 27

MOTIVE POWER OF CURTAIN MACHINES, 1923, 1937 AND 1946

Year	SCOTLAND					NOTTINGHAM					TOTAL				
	No. of machines	I.M.D. No.	I.M.D. %	C.S. No.	C.S. %	No. of machines	I.M.D. No.	I.M.D. %	C.S. No.	C.S. %	No. of machines	I.M.D. No.	I.M.D. %	C.S. No.	C.S. %
1923	390	223	*57*	167	*43*	314	32	*10*	282	*90*	704	255	*36*	449	*64*
1937	381	297	*78*	84	*22*	322	79	*25*	243	*75*	703	376	*54*	327	*46*
1946	383	351	*92*	32	*8*	258	80	*31*	178	*69*	641	431	*67*	210	*33*

I.M.D.=Individual Motor Drive C.S.=Common Source (belt drive.)

TABLE 28

WIDTH AND MOTIVE POWER OF CURTAIN MACHINES IN SCOTLAND, 1923 AND 1946

Width of machine in inches	1923 Number of Machines			1946 Number of Machines			Increase (+) or Decrease (−)		
	I.M.D.	C.S.	Total	I.M.D.	C.S.	Total	I.M.D.	C.S.	Total
Less than 100	—	2	2	—	—	—	—	−2	−2
100–149	—	—	—	—	—	—	—	—	—
150–199	—	7	7	—	—	—	—	−7	−7
200–249	18	41	59	22	11	33	+4	−30	−26
250–299	9	13	22	12	4	16	+3	−9	−6
300–349	51	43	94	70	6	76	+19	−37	−18
350–399	124	54	178	167	10	177	+43	−44	−1
400–449	16	7	23	68	1	69	+52	−6	+46
450–499	5	—	5	12	—	12	+7	—	+7
Total	223	167	390	351	32	383	+128	−135	−7

TABLE 29

WIDTH AND MOTIVE POWER OF CURTAIN MACHINES IN NOTTINGHAM, 1923 AND 1946

Width of machines in inches	1923 Number of Machines			1946 Number of Machines			Increase (+) or Decrease (−)		
	I.M.D.	C.S.	Total	I.M.D.	C.S.	Total	I.M.D.	C.S.	Total
Less than 100	1	1	2	—	—	—	−1	−1	−2
100–149	—	—	—	—	—	—	—	—	—
150–199	—	8	8	—	4	4	—	−4	−4
200–249	9	75	84	4	34	38	−5	−41	−46
250–299	2	49	51	2	35	37	—	−14	−14
300–349	6	74	80	18	52	70	+12	−22	−10
350–399	7	52	59	20	45	65	+13	−7	+6
400–449	5	23	28	33	8	41	+28	−15	+13
450–499	2	—	2	3	—	3	+1	—	+1
Total	32	282	314	80	178	258	+48	−104	−56

is still most frequently encountered (nearly half the machines in 1946), and 10-point (over one-fifth) is the next most common.* There is little difference in the range of machines between Scotland and Nottingham.

TABLE 30

GAUGE OF CURTAIN MACHINES, 1923, 1937 AND 1946

Gauge	1923		1937		1946	
	Number of machines	Width (inches)	Number of machines	Width (inches)	Number of machines	Width (inches)
4-pt.	2	604	8	1,888	7	2,004
5-pt.	—	—	1	240	1	240
6-pt.	8	2,416	11	4,125	11	4,125
6½-pt.	4	1,584	5	2,064	5	2,064
7-pt.	33	10,442	35	11,456	28	9,298
7½-pt.	3	1,080	3	1,080	3	1,080
8-pt.	311	105,169	328	119,034	312	117,016
8½-pt.	1	250	—	—	—	—
9-pt.	58	17,751	45	14,353	37	12,390
10-pt.	152	46,935	144	46,779	135	44,979
11-pt.	9	2,256	8	1,929	2	439
12-pt.	64	17,964	60	17,207	54	15,833
13-pt.	3	814	3	814	—	—
14-pt.	27	7,048	28	7,666	23	6,518
15-pt.	10	2,627	8	2,210	8	2,210
16-pt.	14	3,291	11	2,751	10	2,463
18-pt.	1	240	1	240	1	240
20-pt.	4	840	4	840	4	840
Total	704	221,311	703	234,676	641	221,739

Summary. The number of curtain machines in working order remained at just over 700 from 1923 to 1937: as a result of the war the number had fallen by 9 per cent in 1946. But the capacity measured in total width of machines remains still a fraction above the 1923 level. Bearing in mind the improvements in motive power the present productive capacity per unit of time is definitely greater than it was 23 years ago.

The share of Scotland in total machine capacity has been growing during the period; most of the machines in Scotland now have individual motors, while in Nottingham two-thirds are still driven from a central source; and the proportion of the Scottish machinery which is new or reconditioned is twice as great as in Nottingham.

IV. MANPOWER

We have discussed earlier in the report labour supply prospects for the lace trade as a whole, drawing largely upon data provided by the Ministry of Labour and National Service. Additional information was sought in the Working Party questionnaire.

* 8-point was also the most common in U.S.A. in 1921. The U.S. industry has, however a much larger proportion of coarse-gauge machines, and correspondingly fewer fine-gauge.

TABLE 31

EMPLOYMENT* IN THE LACE FURNISHINGS SECTION 1937 AND JUNE 1946

	SCOTLAND						NOTTINGHAM					
	Male			Female			Male			Female		
	1937	1946	1946 as % of 1937	1937	1946	1946 as % of 1937	1937	1946	1946 as % of 1937	1937	1946	1946 as % of 1937
1. Twisthands	530	292	*55*	—	—	—	342½	130	*38*	—	—	—
2. Auxiliary workers	505	342	*68*	733½	382	*52*	166½	110	*67*	504	185	*37*
3. Factory office staff	18	9	*50*	33	24	*73*	30	12	*40*	8	8	*100*
4. Operatives engaged on finishing	25	12	*48*	232½	108	*46½*	5	—	—	43	—	—
5. Designers, draughtsmen and card punchers	76	24	*31½*	39	5	*13*	62	10	*16*	4	1	*25*
6. Office and sales staff (including working proprietors, working directors and departmental managers; but excluding staff already entered under 3)	135	77	*57*	85	40	*47*	98½	75	*76*	29	17	*59*
7. Outworkers	—	—	—	—	—	—	—	—	—	5	3	*60*
Total	1,289	756	*59*	1,123	559	*49½*	704½	337	*48*	593	214	*36*

* The 1937 figures for Scotland exclude three firms with 17 machines but include two establishments controlled from Nottingham. The 1937 figures for Nottingham exclude all workers of three firms controlling 18 machines. They include 32 twisthands but not the corresponding auxiliary workers for firms which did not make returns, and for which the number of twisthands but not the number of other operatives was known.

TABLE 32

AGE DISTRIBUTION OF WORKERS IN LACE FURNISHINGS SECTION IN JUNE 1946

	SCOTLAND								NOTTINGHAM							
	Male				Female				Male				Female			
	Under 18	18–40	41–65	Over 65	Under 18	18–40	41–60	Over 60	Under 18	18–40	41–65	Over 65	Under 18	18–40	41–60	Over 60
Twisthands . .	—	88	187	17	—	—	—	—	—	33	73	24	—	—	—	—
Auxiliary workers* .	70	121	105	46	31	168	159	24	20	25	50	15	9	44	102	30
All others† . .	2	28	71	21	37	80	51	9	2	21	31	43	4	15	8	2
Total	72	237	363	84	68	248	210	33	22	79	154	82	13	59	110	32

* Spoolers; Shuttlers, threaders and strippers; Brass bobbin winders; Warpers; Slip, spool or bobbin winders; Shuttle sorters; Menders (grey); Drawers (grey); Tenters or loom mechanics; Foremen; Forewomen; Other workers not included elsewhere.

† Factory office staff; operatives engaged on finishing; designers, draughtsmen and card punchers; office and sales staff (including working proprietors, etc.); outworkers.

The labour position in Scotland is so entirely different from Nottingham that total labour figures for the industry do not mean very much, and accordingly we shall throughout this section give figures for the two centres separately. In Table 31 we give the number of various types of worker employed in 1937 and mid-1946. The figures for 1937 are the average of two weeks, in March and October, and they exclude 6 firms, holding 35 machines: they thus understate by fully 100 workers the total numbers employed. The 1946 figure is the position at 18 June 1946. We also give, for the various types of worker, the 1946 figure as a percentage of 1937: in this way we can most easily discern the relative changes.

In Scotland in June 1946 male employment was 59 per cent and female 49½ per cent of 1937. The proportion of twisthands—key-workers—was a little less than the average. But the most significant short-fall is 'designers, draughtsmen and card punchers': in mid-1946 only 29 were employed, against 115 in 1937. This is partly lack of demand due to lack of yarn, and to the fact that at present manufacturers can sell without making any new designs at all. These figures apply only to designers, draughtsmen and card punchers employed by machine-holders; for example, they do not take account of commission designers, etc. But we have ample evidence that the number of the latter also have declined so that the present number of designers, draughtsmen and card punchers, all of whom require long training, is seriously deficient. The importance of training designers, draughtsmen and card punchers cannot be over-emphasized since without an adequate supply the remaining workers in the trade cannot be employed. At present the bottleneck is yarn. The Scottish section should make sure that when this bottleneck is broken—it is not confronted with another—skilled labour.

The position in Nottingham is rather similar. Male employment in mid-1946 was 48 per cent of 1937 and female 36 per cent. Again we observe a short-fall in twisthands—only 38 per cent; and in 'designers, draughtsmen and cardpunchers' —11 in mid-1946 against 66 in 1937. In the Scottish area there is unemployment and the workers have, at present, no alternative employment. This is not the case in Nottingham, and from the point of view of the Lace Furnishings section the necessity to train twisthands and designers, draughtsmen and card punchers is even greater.

The difficulties which will be encountered for some time to come in the lace trade from an abnormally high proportion of older workers, obvious before the war and seriously accentuated by the war, have already been stressed in Chapter II. Renewed emphasis is given to this factor by the figures in Table 32 of the age distribution at the middle of 1946.

V. RAW MATERIALS

No new figures for raw material consumption were obtained from the Working Party questionnaire. From the 1937 I.D.A. Inquiry we obtained figures for 51 establishments employing 11 or more operatives. (Table 33)

For the period November 1946 to February 1947 yarn allocations adjusted to an annual rate amounted to 5,611,000 lb. of cotton, of which a little over a third was for utility curtain nets for the home trade and the remainder for export, and 1,515,000 lb. of rayon, all for goods for export. These allocations represent respectively a little over 50 per cent and about 100 per cent of 1937 consumption. In addition, an *ad hoc* quantity of cotton, amounting to 1,120,000 lb., is being

made available over an extended period. In view of the heavy consumption of cotton yarn in this section we are considerably perturbed by the prospect of a continued shortage. Since this section is a heavy user of a small range of counts we have recommended that it should establish its own spinning mill to supply a proportion of its demand. The mill should be located in Scotland and should have good prospects since there is likely to be some labour to draw upon in the district which is a Development Area.*

TABLE 33

MATERIALS PURCHASED AND USED BY 51 ESTABLISHMENTS IN THE LACE FURNISHINGS SECTION IN 1937

	Weight lb.	*Value* £
Cotton yarn	9,503,000	693,090
Rayon yarn	1,519,000	156,000
Packing materials		11,000
Other purchased materials		153,000
Coal, electricity and other fuels		24,000

VI. THE ANALYSIS OF THE INDUSTRY

The typical lace furnishings firm is small, by whatever standard of measurement chosen. The I.D.A.I. returns give the following classification for 51 establishments employing 11 or more operatives (it will be remembered that as a rule one establishment means one firm in this section).

TABLE 34

SIZE OF ESTABLISHMENTS IN THE LACE FURNISHINGS SECTION BY NUMBERS EMPLOYED IN 1937

Number Employed	*Number of Establishments*
11–24	4
25–49	17
50–99	19
100–149	6
150–199	2
200–249	1
250–299	1
300 and over	1
	51

Four-fifths of the establishments employed fewer than 100 operatives. In the Working Party questionnaire the firms were classified according to the number of machines in working order in their firms in the average of the years 1936-40. Three firms out of five had 10 machines or less: the typical firm was one with 6 to 10 machines. We notice that in Scotland the size of firm tended to be rather more uniform than in Nottingham. The largest firm in the industry had between 50 and 100 machines, i.e. rather more than about 10 per cent of the total number of machines in the section.

* See Recommendation 4.

TABLE 35

SIZE OF FIRMS IN THE LACE FURNISHINGS SECTION BY NUMBER OF MACHINES IN 1936–40

Number of Machines	Number of Firms			Number of Machines in the size groups		
	Scotland	Nottm.	Total	Scotland	Nottm.	Total
Up to 5	—	4	4	—	15	15
6–10	18	7	25	142	57	199
11–15	6	4	10	75	52	127
16–20	2	2	4	35	36	71
Over 20	3	3	6	114	100	214
Total	29	20	49*	366	260	626

The average turnover in the years 1936-40 at prices to the wholesaler, of the 48 firms for which full returns were received was £1,870,000 of which £1,356,000 (72½ per cent) was home trade and £514,000 (27½ per cent) was exported.† The average annual turnover of a lace furnishings firm is thus seen to be £39,000 a year.

Although the typical firm was small the range of sizes within the industry is still considerable—the largest firm having 50 to 100 machines against the three machines of the very smallest. We endeavoured to supplement our qualitative impression of the most suitable size of firm under present conditions with a quantitative measure of efficiency. It proved impossible, however, to obtain any decisive statistical information. Owing to the impossibility of establishing any measure of physical volume of output which (*a*) would be significant and (*b*) could be obtained in 1946 for a pre-war year, we were compelled to fall back on the money value of output, expressed on a common basis of the price charged to the wholesaler. This measure has two obvious weaknesses: (i) It includes the value of materials used. If we had been able to subtract this cost we should have obtained the Census of Production concept of net value added, which when divided by the number of operatives, is itself only a very imperfect measure of efficiency. As it is, the proportion of the value in the brown which represents materials, varies with the quality‡ and intricacy of the webbing. (ii) By expressing all turnover in prices to wholesale we have included the cost of bleaching, dyeing and dressing and also of finishing, all of which may be done on commission for the machine-holder. The proportion which these items represent of the price to wholesalers is highly variable but there does seem to be an inverse correlation

* The table covers 48 firms out of 57 with a total of 626 machines out of a total of about 700. One Nottingham firm is entered both under Nottingham and Scotland, since it has establishments in both areas.

† The returns covered 48 firms with 626 machines: though one firm gave details only of machines and turnover and no figures for labour, nine firms with another 77 machines are not included at all in Table 35 and the subsequent analysis. To obtain a figure for the total turnover of the industry we might allow the same turnover per machine for the nine firms which did not submit details. A calculation on this basis gives an average annual turnover of £2.1 million for the Lace Furnishings section as a whole in the years 1936–40.

‡ Throughout the Report wherever we use the word 'quality', it is in the sense special to the lace trade meaning the number of complete motions of the bobbin per unit of length of lace webbing.

TABLE 36

ANALYSIS OF LACE FURNISHINGS SECTION 1936–40 BY SIZE OF FIRMS
(grouped according to number of machines)

	SCOTLAND (No. of machines)					NOTTINGHAM (No. of machines)				
	Up to 5	6–10	11–15	Over 15	Total	Up to 5	6–10	11–15	Over 15	Total
1. No. of firms	—	18	6	5	29	4	7	4	5	20
2. Turnover*	—	£584,000	£272,000	£413,000	£1,269,000	£20,000	£226,000	£88,000	£267,000	£601,000
3. No. of Machines	—	142	75	149	366	15	57	52	136	260
4. No. of twisthands	—	211†	106	178½	495½‡	14	95½	50	151	310½
5. No. of operatives (incl. twisthands)	—	772†	347	591	1,710‡	44½	311	166½	505	1,027
6. Turnover per machine	—	£4,111	£3,621	£2,771	£3,467	£1,353	£3,959	£1,701	£1,965	£2,313
7. Turnover per twisthand	—	£2,611	£2,562	£2,313	£2,493	£1,450	£2,363	£1,769	£1,770	£1,937
8. Turnover per operative	—	£714	£783	£699	£723	£456	£726	£531	£529	£586
9. Twisthands per machine	—	1·57	1·41	1·20	1·38	0·93	1·68	0·96	1·11	1·19
10. Operatives per machine	—	5·72	4·63	3·97	4·76	2·97	5·46	3·20	3·71	3·95
11. Other operatives per twisthand	—	2·66	2·28	2·31	2·46	2·18	2·26	2·33	2·34	2·31

* At prices to the wholesaler. † These figures are for 17 firms only. Allowance has been made for this in calculating the figures in rows 7 to 11.
‡ These figures are for 28 firms only. Allowance has been made for this in calculating the figures in rows 7 to 11.

with the fineness of the quality of the webbing. We obtained an analysis of the price to the wholesaler of three representative curtain products: (*a*) very low grade; (*b*) average; (*c*) very high grade (see Table 40). In 1937 the proportions of the price covered by bleaching, dyeing, dressing and finishing were respectively (*a*) 33·8 per cent; (*b*) 17·0 per cent and (*c*) 10·9 per cent. Thus the value in the brown corresponding to the wholesale price varies according to the type and quality of product.

These weaknesses of the value at prices to the wholesaler as a measure of efficiency may be discounted to the extent that firms do not specialize according to type of material and gauge and quality of product, and though we lack detailed statistical confirmation, we understand that this specialization is rare. The figures in Table 36, which summarize the information supplied to us, should nevertheless be treated with the utmost caution.

The figures in rows 6 to 11 of Table 36 are averages for the firms in the respective size groups. The number of firms in each size group, both in Scotland and in Nottingham, is in all cases very small, and there is a very wide range between the maximum and minimum figure for firms within the groups (see Table 37).

TABLE 37

RANGE OF TURNOVER IN £'S PER TWISTHAND AND PER OPERATIVE IN THE VARIOUS SIZE GROUPS

	SCOTLAND Number of machines			NOTTINGHAM Number of machines			
	6–10	11–15	Over 15	Up to 5	6–10	11–15	Over 15
Turnover per twisthand in £'s							
Maximum. .	3,451	3,867	2,996	2,523	3,013	2,116	2,298
Minimum .	1,536	1,758	1,541	514	1,208	968	1,605
Average . .	2,611	2,562	2,313	1,450	2,363	1,769	1,770
Turnover per operative in £'s							
Maximum. .	937	967	885	748	1,027	646	664
Minimum . .	405	606	523	206	447	279	454
Average . .	714	783	699	456	726	531	529

The range is indeed very wide: in Nottingham for instance the maximum turnover per operative is in three size groups at least 2¼ times as great as that of the minimum turnover in the *same* group.

Bearing in mind the extreme fallibility of the figures quoted above, we may draw attention to certain outstanding features.

(i) Turnover per machine tends to be larger for the smaller firms, except the very smallest. This is mainly a reflection of the degree of utilization of machinery (see rows 9 and 10 of Table 36). It is not easy to say whether the latter is a mere historical accident or whether it indicates a definite weakness on the part of the largest firms in obtaining a balanced demand which suits their machines. Indeed since curtain machines have long

lives, and since the cost of maintaining an idle machine is not great, one can imagine a firm which has recently installed a number of new machines, and, having plenty of room, has kept a number of old machines in almost complete idleness in case the demand may swing again towards a quality of production requiring the particular gauge of the older machines. Such a firm could in no sense be said to be inefficient—on the contrary—and yet would return a low turnover per machine. On the other hand this explanation can only be valid for one particular year or group of years. Were similar results to be obtained at fairly widely separated intervals, they would indicate inefficiency. On balance we believe that this result is not accidental, but does indicate a weakness of the largest firms. At the other extreme there can be little doubt that the firms with up to five machines are too small to be fully adaptable to change.

(ii) Turnover per twisthand is highest in both centres in the firms with 6 to 10 machines and falls off somewhat as the firms get larger.

(iii) Almost the same is true of turnover per operative, except that in Scotland the 11 to 15 group is rather higher than the 6 to 10 group: while in Nottingham the very small (up to 5) group shows a figure well below the average.

(iv) Even allowing for the qualifications about machines held in reserve, made in (i) above, it seems fairly certain that during 1936–40 there was substantial surplus machine capacity in the section. The Lace Furnishing Manufacturers' Associations estimate that as compared with an actual turnover of about £2·1 million in 1936–40 and an employment of about 2,050 males and 1,750 females, the maximum possible output for the whole section on the basis of a 96 machine hour week, would be £4,000,000 giving employment to 3,200 males and 2,700 females. These estimates are based on an allowance of two twisthands per machine, and, of course, take no account of the necessary 'reserve' of idle machines required for changes in style and seasonal fluctuations. But even if this reserve were as high as 25 per cent there would still have been a true surplus capacity in 1936–40 of 25 per cent. Row 9 of Table 36 shows that the position in Nottingham was rather more acute than in Scotland.

(v) The turnover per twisthand in Scotland is notably higher—about 30 per cent—than in Nottingham; the turnover per operative is also 20 to 25 per cent higher in Scotland. We are of the opinion that a considerable part of this difference is to be explained by the better deployment of labour in the Scottish firms, and we have attempted to confirm our opinion by a careful examination of the facts.

The most vivid way in which we can illustrate the difference in the deployment of labour is to calculate the numbers of each type of worker corresponding to one twisthand (known in Scotland as a weaver) for the year 1937. The results are shown in Table 38.

TABLE 38

NUMBER OF ALL TYPES OF EMPLOYEE CORRESPONDING TO ONE TWISTHAND IN 1937

Item	*Scotland*			*Nottingham*		
(1) Shuttlers/Threaders, etc.	·275	·362		·224	·321	
(2) Brass Bobbin Winders	·087			·097		
(3) Warpers	·076			·058		
(4) Winders	·417			·428		
(5) Factory Office Staff	·096			·122		
(6) Spoolers	·253	·533	·665	·032	·225	·254
(7) Other workers	·280			·193		
(8) Shuttle Sorters	·049	·132		Nil	·029	
(9) Tenters/Loom mechanics	·083			·029		
(10) Menders	·570		·817	1·079		1·098
(11) Drawers/Examiners	·247			·019		
	2·433		1·482	2·281		1·352

The differences in the methods of deployment of labour come out mainly in items 6 to 11. The differences in items 1 to 6 are either small, or admit of explanation in terms of the machines themselves or of auxiliary machinery. Thus:

Item 1. There are more threading machines in Nottingham: hence the economy in threaders.

Item 2. There are more new machines in Scotland, and the newer machines tend to have larger brass bobbins: hence the economy in bobbin winding.

Item 3. Some machine-holders in Nottingham have their warping done on commission.

Items 4 and 5. The differences are small and may not be significant.

Items 6 to 9 bring out the first big differences in deployment in the two areas which are as follows. In Nottingham the curtain machine itself is managed by a single twisthand. In Scotland the twisthand's job is broken into four parts: (1) the Scottish twisthand or weaver himself remains in front of the machine and gives his whole attention to the fabric, to the observation of breakages and to stopping the machine and mending them when they occur. (2) In Scotland there are 'spoolers', who change the empty spools on the spool-board when necessary. (3) In all the Scottish firms, but only in a few Nottingham firms, major operations in the machine, repairs, adjustments and so on, are taken care of by the tenter, or loom mechanic, who is responsible for *all* the machines in the factory. (4) In Scotland there is the 'shuttle-sorter' who has no counterpart in Nottingham. His job is to check over the bobbins which have been wound and made ready for the machine, removing any which are loose, or in any way out of shape or worn. This is more important than it sounds: the machine builders emphasized to us the delicacy of the bobbins and carriages and the considerable slowing-up of output and damage to the machine which could result from careless handling and use of bobbins.

These differences stand out clearly in items 6, 8 and 9 of Table 38. The difference in item 7 is probably not significant, since this item includes stokers employed by the machine-holders, who are relatively more numerous in Scotland owing to the absence of tenement factories.

The advantages of the Scottish specialization is that the twisthand can give his whole attention to preventing breakages and to reducing their length where they do occur. Consequently less mending labour is needed. This is shown in items 10 and 11. The lower Scottish figure for these items may also be partly explained by the greater use of machines for mending. We notice again the Scottish specialization. Examination is largely done by the less skilled drawer or examiner, while in Nottingham it is mainly carried out by the skilled mender herself.

After making an adjustment in item 7 we find that one twisthand in Scotland requires 1·446 operatives to assist him, while in Nottingham he needs only 1·352. But in terms of skill and in terms of production the picture is different. Thus the requirements of skilled and unskilled operatives to assist one twisthand are respectively:

	Scotland	*Nottingham*
Skilled operatives (items 7–10) .	·946	1·301
Unskilled operatives (items 6 & 11)	·500	·051
Total	1·446	1·352

In view of the general labour shortage which we expect in the industry, and of the need to recruit adult labour unused to the industry, the advantage of the Scottish deployment is clear.

When we turn to production we have to take into account the fact that the average width of the machine in 1937 in Scotland was 352 inches as against only 312 inches in Nottingham. Now we cannot assume that if the Nottingham machines were wider, the same number of twisthands (with the same number of assistants) could produce the same number of *racks* as before. Moreover, there would certainly be a tendency for the number and length of breakages to increase disproportionately. It is, indeed, partly to overcome this problem that the Scottish deployment was developed.

If the rack output per twisthand per hour was the same in the two centres, the Scottish twisthand, with the wider machine, and using rather more auxiliary labour, would produce 13 per cent greater output. Put the other way round: on a common volume of production each Scottish twisthand would need 1.446 other operatives while each Nottingham twisthand would require 1·53, i.e. 5 to 10 per cent more. In fact rack output per twisthand per hour in Scotland is about 15 per cent higher than in Nottingham.* As a result the overall productivity per operative included in items 6 to 11 is 20 to 25 per cent higher than in Nottingham.

We would emphasize that a considerable part of the higher productivity is due simply to the greater width of the machines in Scotland (though this itself is not accidental), so that were Nottingham firms to go over at once to the 'Scottish' system, they would probably not raise productivity to this extent. But quite apart from the higher productivity achieved by the Scottish method, the wider variety of occupations achieved permits a smoother advancement of the juvenile from his entry into the trade until he or she attains the highest skill.

* This figure was provided from the records of British Lace Furnishings Ltd.

We have no hesitation in recommending the earliest adoption of the 'Scottish' system in Nottingham since the labour scarcity is particularly acute there. In doing so we are aware that we are pushing at a door which is already half open, since the introduction of this system has already been approved in principle by both sides of the Nottingham industry. But we felt that much was to be gained by attempting to assess the order of magnitude of the gains to be obtained, in the hope that studies of this kind, of which the above is only a tentative beginning, will be more fully developed by the industry itself.*

These observations lead to the following conclusions, to which reference is made in our recommendations.

(1) The statistics do nothing to disprove our contention that, in the Lace Furnishings section, the most economical unit is in the small or small medium firm: defined more precisely as a firm with between six and fifteen machines. The very small and the very large firms seem to show definite weaknesses.†

(2) It seems fairly clear that all-round efficiency in Scotland is somewhat higher than in Nottingham, and one of the main causes of this difference appears to be the better deployment of labour in Scotland.

(3) The capacity of the industry was substantially greater than was required for the volume of pre-war production. Even if the shortages of labour and yarn can be overcome, and the increase in production achieved to meet the expected increase in demand in full, there may still be some redundant machinery.

(4) The variations in turnover per operative within each group of firms of the same size are extraordinarily wide. There are so many possible reasons to account for these variations that we have been unable to draw any conclusions: but there is little doubt that the problem merits further and more detailed investigation. The information which we have obtained seems to us sufficient to establish the case for the Scottish method of labour deployment. Other problems of similar relevance to efficiency might well be illuminated by a more systematic study.

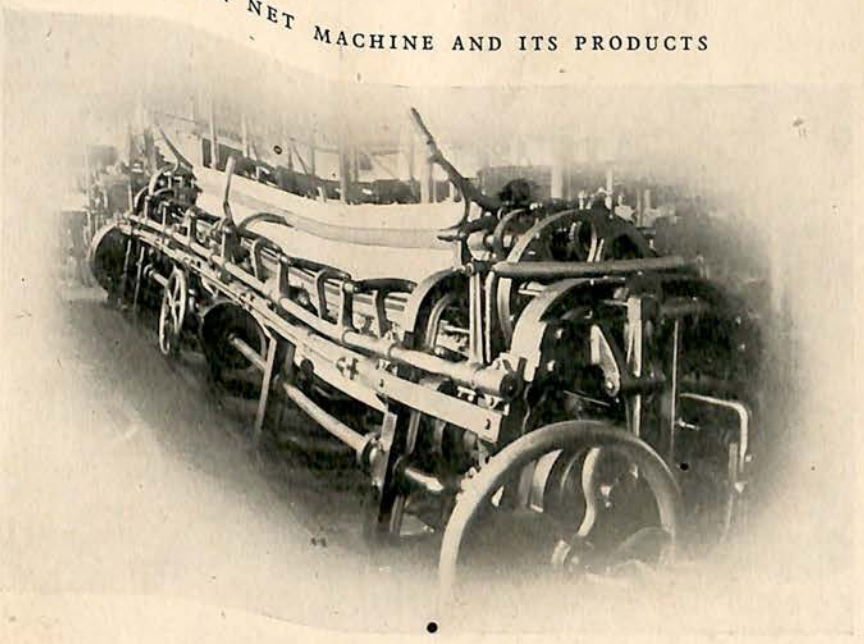
VII. COSTS OF PRODUCTION AND DISTRIBUTION

Production costs depend very much upon the quality of the article produced, which ranges from the simplest square mesh netting to the most complicated napery which may, and indeed for special occasions does, very closely resemble a tapestry. We asked for costings of three representative products: (a) very low grade (b) average and (c) very high grade (Table 39), and we show a detailed breakdown of these costs (Table 40).

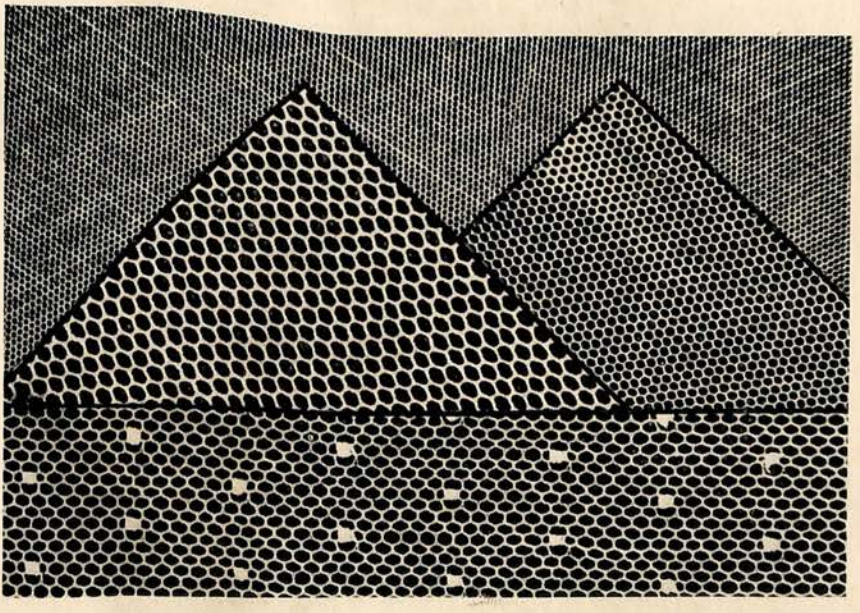
A detailed comparison of 1937 and 1946 would not prove particularly fruitful, in view of the abnormality of the latter year. As far as the wholesale price of lace furnishing articles is concerned, it is clear that the machine-holder himself is responsible for only a small part of it; 27·3 per cent for (*a*); 38·7 per cent for (*b*) and 51·4 per cent for (*c*) in 1937. Yarn, and the dressing, finishing and distribution processes account for the remainder. Nevertheless the machine-holder should seek economies which, if accompanied by similar economies on the part

* See recommendations 13 and 14.

† On the other hand the typical U.S. firm has 30 machines, or more. There is evidence that U.S. production is more standardized, but we know too little about the position to be able to qualify our remarks about the large firm in Britain.



Plain Net machine



(*Top*) Sandfly netting, embroidery base or dress net
(*Centre*) Mosquito netting and bobbin net for dress purposes
(*Bottom*) Point d'esprit (spot net)

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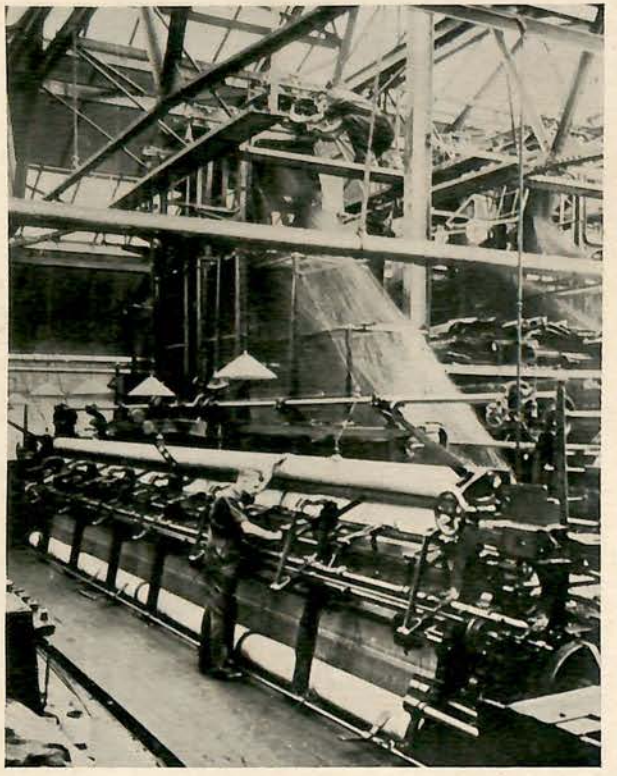
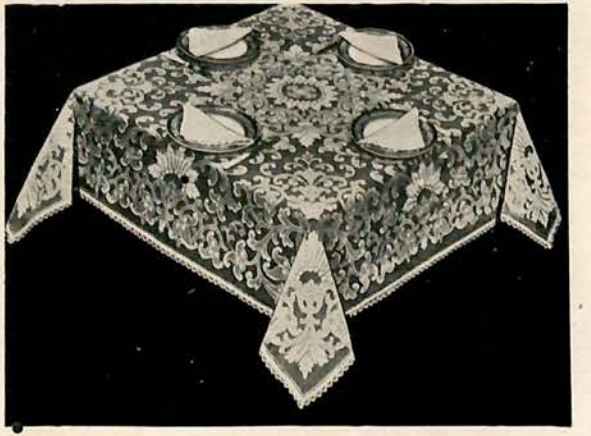
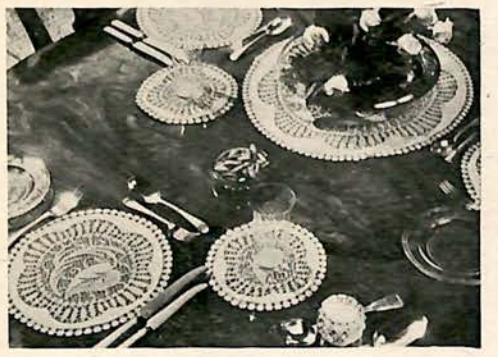


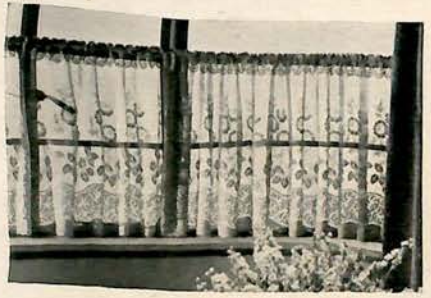
Nottingham lace curtain machine



Supper or dining cloth

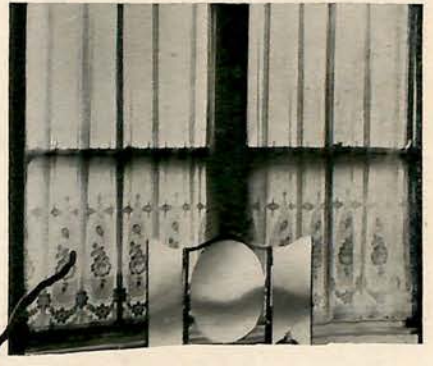


Luncheon set



Brise bise

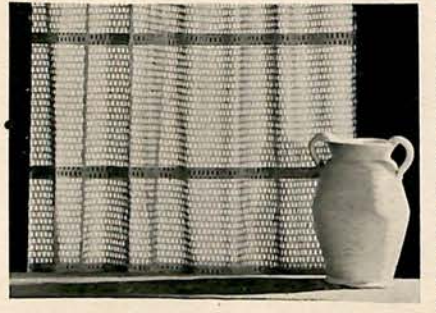
Panel brise bise

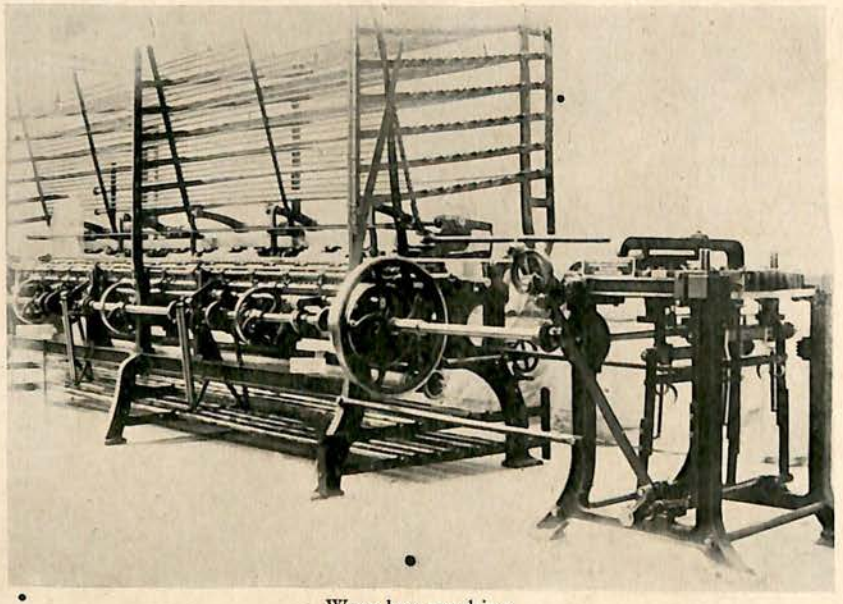


Store curtain

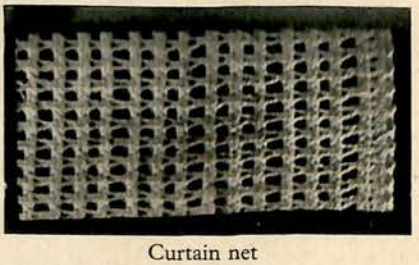
All-over net

All-over net

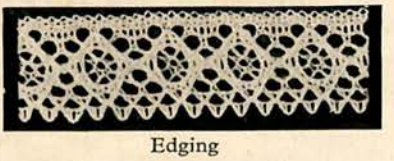




Warp lace machine

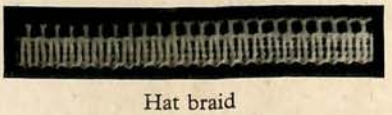


Curtain net

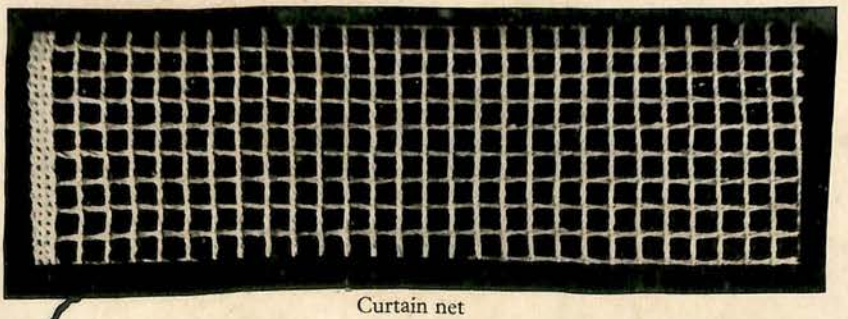


Edging

Edging



Hat braid



Curtain net

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TABLE 39

AVERAGE SELLING PRICE TO WHOLESALE (FINISHED) OF THREE REPRESENTATIVE LACE FURNISHINGS PRODUCTS 1937 AND 1946*

	1937	1946	Index (1937=100)
(*a*) very low grade. 6-point single border curtain, 28 in. by 2½ yards: *per pair*	17½d.	45⅞d.	*261*
(*b*) average. 10-point 36 in. Brise-bise: *per yard*	10d.	30⅛d.	*301*
(*c*) very high grade. 16-point 48 in. net: *per yard*	25¾d.	82⅜d.	*320*

TABLE 40

BREAKDOWN OF SELLING PRICE OF THREE REPRESENTATIVE LACE FURNISHINGS PRODUCTS IN 1937 AND 1946

	Very low grade product		Average Product		Very high grade product	
	1937	1946	1937	1946	1937	1946
	pence	pence	pence	pence	pence	pence
(*a*) cost of materials	5·1	13·8	3·5	9·4	7·2	16·3
(*b*) cost of labour	1·9	3·2	1·5	3·2	5·5	13·6
(*c*) design and card expenditure†	·7	2·4	·6	2·4	2·0	10·2
(*d*) direct conversion cost (including drive, light, heat, water, repairs and renewals, mill furnishings)	·2	·4	·2	·4	·7	1·5
(*e*) bleaching, dyeing and dressing‡	4·1	6·3	1·2	3·3	2·4	4·5
(*f*) finishing and making up	1·8	5·6	·5	·8	·4	·6
(*g*) production and selling overheads and profit†	3·7	12·1	2·5	9·3	7·5	31·8
(*h*) contingencies	—	2·1	—	1·4	—	3·9
Total	17·5	45·9	10·0	30·2	25·7	82·4

* The prices of the articles in this table and the costs breakdown in Table 40 are the prices and costs of a single but typical product in each of the three groups.

† Owing to the complete cessation of raw material supplies for normal lace furnishings products during the war years and thus of normal trading by machine-holders, there are no current data available for items (c) and (g) in Table 40. In these circumstances, an estimate has had to be made to complete the prices, the basis of which is twice the pre-war sterling cost of these items to cover wartime increases, applied to 45 per cent of the pre-war volume of production.

‡ Bleaching, dyeing and dressing costs are based throughout on vat dyed biscuit shade.

of the spinners, dressers and finishers, etc., would lead to a visible reduction of price. In this respect we may draw attention to the very large part played by design and card punching in the conversion cost.

Details of the distribution costs of lace furnishings articles after leaving the machine-holder are rather slender. Since 1942 the controlled margins have been 21·22 per cent on cost (17½ per cent on returns) for wholesalers and 42·86 per cent on cost (30 per cent on returns)* for retailers. Wholesale margins before the war were probably somewhat lower on the average and retail margins about the same. The amount of lace furnishings production affected by these controlled margins is at present negligible. More recently the utility curtains and table covers whose production has been started since the war, have been controlled at the normal margins on utility textiles of 17·65 per cent on cost (15 per cent on returns) for wholesalers and 33⅓ per cent on cost (25 per cent on returns) for retailers.

CHAPTER V. THE PLAIN NET SECTION

I. INTRODUCTION

PLAIN net, bobbin net or bobbinet as it is called in the United States, is a plain hexagonal mesh fabric, and is an imitation of plain pillow lace. The plain net machine is more versatile than its name implies and its products include, in addition to the typical hexagonal mesh net, diamond mesh net, striped net (whose pattern consists of stripes of varying width divided from one another by bands of plain net), and 'point d'esprit'. The latter is a plain net with small spots at regular intervals: the effect being obtained by the attachment of a small Jacquard apparatus to the roller locker machine.†

Though a large part of plain net production is used for protection against mosquitoes and sandflies, there is also a substantial production of nets, particularly of rayon and silk, for bridal veils, dress purposes and as a base for embroidery, and of coarse nets for making hat shapes. Elastic plain net is a recently developed product and is used for a variety of purposes.

II. THE STRUCTURE OF THE SECTION

There are 22 firms in existence today in this section of the lace trade, and nearly twice as many establishments. The position has hardly changed since 1923 (Table 41). The majority of the establishments are in the Nottingham area, but since the establishments of two Derby firms and the West of England establishments are well above the average in size, over 70 per cent of the plain net machines are in the last two areas. The location of the West Country firms is of historical interest. The plain net machine was invented in 1809 in Loughborough by Heathcoat; in 1816, after the Luddite riots, he moved his mill to Tiverton in Devon.

* Since this was written the retail margin has been reduced to 27½ per cent.

† There are two types of plain net machine. In the older double locker machine the carriages are knocked through the machine by two locker bars, one in front and one behind. In the newer roller locker the carriages have a number of 'tails' which mesh with four rollers which control the motion of the carriages to and fro. The double locker machine makes very good netting but cannot be driven at the speed of the roller locker.

In 1937 all the Nottingham firms and one of the West of England firms sold the net in the brown state to finishers: the Derby firms also sold some of their output in the brown to finishers, but one of them was also 'vertical' (i.e. it converted the yarn to netting and bleached, dressed and finished the net itself), and sold to wholesale, retail, shippers and makers-up. One of the West of England firms also was completely 'vertical', selling the finished product direct to wholesalers at home and abroad, and to shippers and makers-up. The vertical tendency has been increasing since 1937, and though several machine-holders retain their old name, they are financially linked with finishers and dressers.

TABLE 41

FIRMS AND ESTABLISHMENTS IN THE PLAIN NET SECTION 1923, 1937 AND 1946*

Area	1923		1937		1946	
	Firms	Establishments	Firms	Establishments	Firms	Establishments
Nottinghamshire	14	25	15	26	15	31
Derbyshire	3	11	4	9	4	8
West of England	2	6	2	5	2	4†
Total	19	42	21	40	21	43

III. THE MACHINES

Exact details of the machinery position in 1923, 1937 and 1946 could not be obtained, but the figures in Table 42 are sufficiently accurate for our purpose.

TABLE 42

NUMBER OF PLAIN NET MACHINES 1923, 1937, 1946

(i) Number of machines in 1923	1,568
(ii) Number scrapped or destroyed since 1923	452
(iii) Number sold overseas since 1923	38‡
(iv) Number shown in (i) that have since been reconditioned	120
(v) Number of new machines erected to replace (ii) and (iii)	26
(vi) Number of new machines erected since 1923 in addition to (v)	9
(vii) Number of machines standing that have not been used since 1927	46
(viii) Number of machines in 1937	1,466
(ix) Number of machines in 1946	1,270

* Returns were obtained for the Working Party by the British Plain Net Manufacturers' Association. Twenty-one out of 22 firms made returns completed in varying degrees. The missing firm is small. The I.D.A.I. of 1937 gives only 15 firms, employing 11 or more operatives. They recorded four firms employing less than 10 operatives; two plain net firms had been included in the Leavers section because they had very few plain net machines:

The figure for the number of machines in 1923 is certainly an under-estimate, and is known to exclude the machines of four firms: moreover, since 452 machines were scrapped, 38 sold overseas and only 35 new machines were installed since 1923, and there are 1,270 machines in existence today, a figure of 1,800 for 1923 would be nearer the mark.* The reduction in the number of machines since 1923 is thus about 30 per cent. Major reconditioning has been on a very small scale: less than 10 per cent of the machines standing today have undergone such reconditioning in the last 23 years. Less than three per cent of the present machines have been installed since 1923. As in the Leavers section, this very slow reconditioning and replacement of machinery is disquieting. In one respect it is more so. The troubles of the Leavers section can be largely attributed to the collapse in demand which followed the 1914–18 war, and which afflicted overseas centres as sharply as our own. No such collapse occurred in plain net. The intense competition of the French manufacturers, who enjoyed the advantage of modern plant and machines constructed under reparations, and were further assisted by successive depreciations of the franc, was offered to us as an explanation of the slow progress of the British industry. But we feel that such competition should have acted rather as a spur than as a brake. Against this it must be said that a certain amount of reconditioning has almost certainly not been recorded in the above table, and it is sometimes claimed that modern machines are not in all ways superior to the old ones which have been reconditioned. We are not convinced on this point, and, indeed, there are so few new machines as to make comparison of outputs between new and old machines almost impossible, and it is certainly well-established that the more modern roller locker has a higher rate of production than the double locker machine. Since the bulk of plain net production is standardized, and since the shortage of manpower is, and is likely to remain, a serious problem for the industry, the necessity to seek more productive machinery would appear to need little emphasis.

Relatively little new building, other than that occasioned by fires, has taken place in recent years in this section. As a result over three-quarters of the machines have the traditional 'common source' belt drive; the remaining quarter are driven in groups by electric motors; only 2 per cent are driven by individual electric motors. Details of width and gauge of the machines could not be obtained for all machines in each of the years 1923, 1937 and 1946; but details were obtained for samples which vary between 72 and 80 per cent of the total in the case of widths, and between 96 and 97 per cent for gauges. We have no reason to believe that the excluded machines were exceptional in either width or gauge. Accordingly the distributions of the machines by width and gauge, given in Tables 43 and 44, are given in percentage form.

that leaves one firm unaccounted for. I.D.A.I. reported a very much smaller number of establishments. The probable explanation of the difference is that in the Working Party questionnaire separate shops or departments with the same address were regarded as separate establishments.

† Including two establishments belonging to a Nottingham firm.

‡ Thirty-four of these machines were on hire purchase and returned to machine builders in 1931: most have been subsequently sold abroad.

* Reporting in 1934 the U.S. Tariff Commission stated that 'The English Industry operates 2,600 of the approximately 4,000 bobbinet machines in existence'. It is not stated how this figure of 2,600 was obtained.

TABLE 43

PERCENTAGE DISTRIBUTION OF PLAIN NET MACHINES BY WIDTH IN 1923, 1937 AND 1946

Width in Inches	1923		1937		1946	
	No.	%	No.	%	No.	%
100–120 .	196	15·6	120	11·0	77	8·4
121–140 .	24	1·9	7	0·6	—	—
141–160 .	151	12·0	134	12·3	57	6·3
161–180 .	168	13·4	120	11·0	74	8·1
181–200 .	168	13·4	154	14·2	134	14·7
201–220 ..	408	32·5	414	38·1	420	46·1
221–240 .	76	6·1	81	7·4	92	10·1
241–260 .	12	1·0	10	0·9	10	1·1
261–280 .	52	4·1	48	4·4	48	5·3
Total	1,255	100·0	1,088	100·0	912	100·0

TABLE 44

PERCENTAGE DISTRIBUTION OF PLAIN NET MACHINES BY GAUGE IN 1923, 1937 AND 1946

Gauge per Inch	1923		1937		1946	
	No.	%	No.	%	No.	%
5 . .	2	0·1	2	0·1	2	0·2
6 . .	5	0·3	4	0·3	3	0·2
7 . .	43	2·8	42	3·0	34	2·8
7½ . .	2	0·1	2	0·1	2	0·2
8 . .	97	6·4	85	6·0	68	5·5
9 . .	241	15·9	234	16·5	192	15·6
10 . .	393	26·0	355	25·0	314	25·5
11 . .	195	12·9	156	11·0	115	9·3
12 . .	310	20·5	328	23·1	313	25·3
13 . .	195	12·9	186	13·1	163	13·3
14 . .	27	1·8	24	1·7	20	1·6
15 . .	4	0·3	4	0·3	4	0·3
Total	1,514	100·0	1,422	100·0	1,230	100·0

It will be seen that in the process of contraction it is the narrower machines which have, as a rule, been scrapped or sold; in 1923 less than a third of the machines were in the 201 to 220 inch range: in 1946 just under half of the machines were of this width. The changes with regard to gauge are much less marked, but there appears to have been a very slight tendency to abandon the coarse gauge machines and to retain the finer gauges.

The manpower position at 31 March 1946 is contrasted with the position in 1937 in Table 45.

TABLE 45

EMPLOYMENT IN THE PLAIN NET SECTION IN 1937 AND AT 31 MARCH 1946*

	MALE			FEMALE			TOTAL		
	1937	1946	1946 as % of 1937	1937	1946	1946 as % of 1937	1937	1946	1946 as % of 1937
1. Twisthands	782	474	61	—	—	—	782	474	61
2. Auxiliary Workers	511	364	71	1,123	790	70	1,634	1,154	71
3. Factory Office Staff	60	40	67	21	33	157	81	73	90
4. Office and Sales Staff†	72	50	69	48	16	33	120	66	55
5. Outworkers	6	1	17	762	472	62	768	473	62
Total	1,431	929	65	1,954	1,311	67	3,385	2,240	66

The position at 31 March 1946 was that employment in the Plain Net section was two-thirds of 1937. The relative shortage of twisthands, to which reference is made elsewhere, is apparent. While the manpower problem is clearly not so acute as in some other sections of the lace industry, it is still a serious one, and is relatively more serious in the Midlands area than in the south-west.

Table 46 shows the age composition of the workers employed at 31 March 1946. The problem of recruitment in all age groups stands out.

TABLE 46

AGE COMPOSITION OF WORKERS IN PLAIN NET SECTION AT 31 MARCH 1946‡

	MALE					FEMALE				
	Under 18	18–40	41–65	Over 65	Total	Under 18	18–40	41–60	Over 60	Total
Twisthands	9	80	330	55	474	—	—	—	—	—
Total	78	215	538	98	929	128	407	659	117	1,311

* These figures relate to 20 firms; two small firms are excluded.

† Including working proprietors, managing directors and departmental managers. Excluding staff already entered under item 3 'Factory Office Staff'.

‡ These figures relate to 20 firms: two small firms are excluded.

V. RAW MATERIALS

While 21 out of 22 firms made returns of manpower and machinery, only 15 made returns of raw material consumption in 1937. We have, however, been able to make an estimate of total consumption of the Plain Net section on the basis of these returns, and of other information about the size of the excluded firms.

TABLE 47

ESTIMATED CONSUMPTION BY THE PLAIN NET SECTION OF RAW MATERIALS IN 1937

	Quantity lb.	Cost £
Cotton yarn	2,545,000	260,000
Rayon yarn	237,000	29,000
Silk yarn	30,000	18,000
Fuel		17,000
All other materials		35,000
		359,000

For the period November 1946 to February 1947 yarn allocations, adjusted to an annual rate, amounted to 1,422,000 lb. of cotton and 320,000 lb. of rayon: i.e. just over one-half the 1937 consumption of cotton, and an increase of about one-third of rayon. All this is for export.

The high proportion of cotton yarn used by the Plain Net section is important, in view of the probable shortage of yarns which must be expected for some years to come. As in the case of the Lace Furnishings section, which is experiencing a similar problem of cotton shortage, we make a recommendation about a possible means of alleviating this shortage (Recommendation 5).

VI. ANALYSIS OF THE SECTION

We sought in our questionnaire to obtain data which would enable us to provide an accurate picture of the structure of the various sections of the lace industry. Unfortunately, some of the plain net firms had not the data available to make complete returns, and there are many gaps in our knowledge of this section. The account which follows is, we believe, not misleading, though it must necessarily be inaccurate in some details. It must be obvious that the value, both to the industry and the public, of an inquiry such as we have undertaken, is very much reduced if the Working Party are unable to obtain accurate data on which to base any recommendations which they may be able to make.

The typical plain net machine-holding firm is much larger than that in any other section of the lace industry. This is to be expected in view of the relatively standardized nature of the product of the section. Of the 21 firms making returns for 1937, the eight with fewer than 16 machines each had between them 52 machines, while the remaining 13 had 1,414 machines, an average size of over 100 machines per firm. The largest firm had nearly 400 machines and employed between 800 and 900 workers in 1937. Moreover, over 70 per cent of the machines were owned by five large firms. There is, however, no evidence that the smaller units were less efficient than the large firms (Table 48).

TABLE 48

ANALYSIS OF PLAIN NET SECTION 1937

	Up to 10 machines	Over 16 machines
No. of firms	8	13
No. of machines	52	1,414
Net selling value per machine*	£734	£550
Net selling value per twisthand*	£1,119	£1,036
Net selling value per operative*	£276	£219

As in other sections, the range of selling value per twisthand and per operative, both among the smaller and the larger firms, is very wide. It is claimed that the completely 'vertical' plain net firm (i.e. which does its own bleaching, dyeing, dressing and finishing) is more economical. We sought evidence on this claim, but no detailed support, e.g. comparative costings, was given to it.

The total turnover of the industry in 1937 (net selling value in the brown) was probably of the order of £1 million, of which over 80 per cent was exported. On the basis of the costings quoted in Table 61, the corresponding turnover at prices to the wholesaler would appear to have been just under £1·5 million. There is undoubtedly a considerable excess machine capacity in the industry, despite the contraction in the number of machines since 1923. Total employment in 1937 was about 3,300 persons. It was estimated that for 12 firms alone (holding about 80 per cent of the machines in the section) full employment on the basis of a 96 machine-hour week would be 4,846.

A breakdown of average production costs in the brown state of three types of products (a high grade, a medium, and a low grade) was obtained from six firms for 1937, and is given in Table 49.

TABLE 49

ANALYSIS OF BROWN SELLING PRICE IN 1937 OF A REPRESENTATIVE PLAIN NET PRODUCT†

	Pence per square yard
1. Cost of yarn	1·74
2. Cost of labour	1·41
3. Direct conversion cost (including drive, light, heat, water, repair and renewals, depreciation, rent, rates, etc.)	·41
4. Production and selling overheads and profit	·46
5. Total brown selling price	4·02

* Calculated on complete returns of five firms in the smaller group and 10 in the larger.

† This product is a rayon net. The breakdown has been arrived at by applying an average percentage breakdown of several plain net products to the middle product analysed in Table 61, p. 91. In a sense this is a fictitious analysis, but we selected this method in order to enable comparison to be made with Table 61, and we do not think the result is misleading.

CHAPTER VI. EMBROIDERY SECTION

AN investigation of the machine embroidery manufacturing section of the lace industry is complicated by questions of definition. We have restricted our investigations to those firms situated in Nottingham who employ the 'schiffli' or multi-shuttle machine, and to that part of their production which is carried out either on net or on a dissoluble base, and which thus results in a product resembling, and to some extent interchangeable with, that of the Leavers machine. Our inquiries thus cover a considerably narrower field than that covered by the committee which examined the industry in 1923 and 1925 in connection with the inquiries into the Safeguarding of Industries.

There are at present 16 firms so occupied, of which one was closed at the time we collected statistics but has since reopened. In 1937 there were 16, and in 1923, 14. Returns from 12 such firms show that in May 1946, 23 per cent of a monthly turnover of £20,662 (i.e. an annual rate of £247,944) represented embroidery on woven fabric the property of manufacturers outside the industry ('façon' embroidery) and 77 per cent the types of embroidery covered by our inquiry, including, however, a certain amount of embroidery on satin purchased by the embroidery manufacturers themselves. In the case of nine firms making returns for the year 1937, 16 per cent of an annual turnover of £105,211, represented 'façon' embroidery and 84 per cent the types with which we are concerned. The schiffli machines of Swiss and German manufacture are big and costly machines (those in use in Nottingham are for the most part 10 yards in width), with two banks of embroidery needles embroidering to a pattern controlled either on the older pantograph or the newer automatic jacquard principle. There is at present no manufacture of either the machines or parts (except needles) in the United Kingdom, and the future supply position is causing manufacturers considerable anxiety. The industry uses Swiss and German machines in about equal proportions. No machines or parts are available from the German machine builders, whose works are situated in the Russian zone, and the future prospects of this industry are quite unknown. Difficulties are also being encountered in placing orders with the Swiss machine-builders. That an adequate supply of replacement parts is essential is self-evident, and although the main principles of the machine appear to have remained unchanged since about 1913, minor improvements in its efficiency still continue, and it would be detrimental to the competitive power of the British industry to be cut off from these improvements. An investigation into the prospects of the German machine-building industry and, if necessary, some arrangement for the manufacture in the United Kingdom of parts for the existing German machines, would seem to be necessary; in the case of Swiss machines, the manufacturers express unwillingness to put machines into production unless they have orders for a complete run. Co-operation among the British buyers would seem to be indicated.* Spare parts for the Swiss machines are understood to be available.

The material on which the embroidery is executed is either plain net, obtained from the plain net manufacturers or finishers, or a specially prepared base (now usually of acetate) which can be dissolved away leaving 'guipure' or 'burnt-out' work resembling in its effect the old point lace. In the case of guipure, no dyeing or dressing processes are usually necessary, since the work is carried out in the

* It is stated that the machines have increased in price since 1939 from £1,200—£1,500 to about £3,000.

white or the required colour. In the case of embroidery on net, dyeing may be necessary and certain dressing processes are needed. There is some mending to be done, chiefly in the form of filling in imperfect patterns by hand-sewing machines, a job requiring considerable skill. At the present time 8 of the 14 firms in operation do their own finishing and sell direct to the wholesale, shipping and makers-up, while 6 of them dispose of the goods to finishers who sell them after carrying out the finishing processes.

Table 50 gives the machine capacity of the section.

TABLE 50

MACHINERY IN THE EMBROIDERY SECTION 1923, 1937 AND 1946

Remarks	Date	Automatic Machines			Pantograph Machines			Grand Total
		Common Source of power	Individual motors	Total	Common Source of power	Individual motors	Total	
Returns from 12 firms	1923	7	24	31	65	10	75	106
Returns from 14 firms	1937	7	62	69	50	16	66	135
	1946	9	56	65	29	25	54	119

It can be seen that the number of automatic machines in operation has increased appreciably, while that of pantograph machines is declining. This is borne out by the fact that while 19 new automatic machines have been installed since 1923 no new pantograph machines have been installed, and in the same period 20 pantograph machines have been scrapped as compared with six automatic machines.* Eleven automatic and 27 pantograph machines have been reconditioned. Pantograph machines are still being manufactured, and there are some types of work which they can do and which cannot be done on the automatics. They are therefore not altogether outmoded, and up-to-date firms like to keep a few in their factories. In general, however, the greater economy of production of the automatic makes them a better proposition. As in other sections, the use of individual motors has been gaining on the use of machines belt-driven from a common source of power.

Unlike the three main sections of the industry, the Embroidery section employs predominantly women workers, even the embroidery machines being generally worked by women. Three women operatives are required to work a pantograph and two an automatic machine if the maximum efficiency is to be attained. The total number of workers employed in 1937 and at two dates in 1946 is given in Table 51.

* The figure of pantograph machines scrapped does not correspond with those showing the change in the number of machines in operation between 1923 and 1946. The discrepancy would seem to be due to the purchase of second hand machines from firms engaged on the production of 'façon' embroidery. Similarly some of the machines recorded as having been scrapped may have been sold to such firms.

TABLE 51

EMPLOYMENT IN THE EMBROIDERY SECTION IN 1937 AND 1946

Occupation	MALES			FEMALES		
	12 firms 1937	13 firms 31 March 1946	13 firms 31 May 1946	12 firms 1937	13 firms 31 March 1946	13 firms 31 May 1946
1. (*a*) Machine operatives	3	10	12	222	150	160
(*b*) Menders (machine)	—	—	—	72	39	42
2. Auxiliary workers (maintenance) . .	14	12	11	5	4	4
3. Office staff on production only . .	6	2	2	11	6	6
4. Operatives engaged on finishing . . .	1	—	2	117	31	48
5. Designers, Draughtsmen and Card Punchers	27	7	10	5	4	4
6. Office and Sales Staff	20	13	14	11	5	6
7. Outworkers . .	1	—	—	69	28	27
Totals	72	44	51	512	267	297

The 1937 consumption of raw materials by this part of the Embroidery industry is shown in Table 52.

TABLE 52

RAW MATERIALS USED IN THE EMBROIDERY SECTION 1937

	lb.	£
Cotton yarn	45,350	7,510
Rayon yarn	35,780	8,450
Lace and Net		6,190
Electricity and Fuel		1,330
Other purchased materials		22,390
Total		45,870

Yarn allocations for the period November 1946 to February 1947, adjusted to an annual rate, amount to 45,900 lb. of cotton and 37,000 lb. of rayon, all for goods for export. These allocations represent just over the 1937 consumption.*

Since the industry is comparatively modern, the premises are, for the most part, good; well-arranged, light, clean (blacklead is not in use as a lubricant), and not overcrowded. We have no recommendations of special applicability to this section to make on this count. These conditions will no doubt help in the rebuilding of the labour force lost during the war. In view of the general labour

*But more firms share in the present allocation than were covered in the 1937 return; and, of the current rayon allocation, some 4,500 lb. are used for weaving the rayon base which is not included in the 1937 rayon yarn figure. Supplies of yarn to the average firm therefore amount to about 80 per cent of 1937 consumption.

position in Nottingham, however, the section is unlikely to be able to regain its pre-war labour force, and in this, as in other sections, every possible measure should be investigated for maximizing the productivity of labour. The replacement of the pantograph by the automatic machine already in progress is a move in this direction. The installation of wider machines is another way of increasing productivity. Both in St. Gall and in Caudry, 15-yard machines are already in operation, and the installation of some of these much wider machines would be of high value to the British industry, since the output per operative is markedly greater than that of the narrower machines. The Continental centres of production also maintain that the employment of men on the machines leads to more and better production than the employment of women, as is the custom in this country. We should advise the British industry to consider the justice of these claims as applied to their conditions.

The British industry is small compared with those of St. Gall and of Plauen before the war,* and though it has gained in recent years in technical proficiency and standard of design, it was generally admitted before the war still to fall behind its rivals in both these respects, and also in price over a wide range of goods. Advances have, however, recently been made particularly in the production of 'guipures' on the dissoluble acetate base, which was a British invention, and the outlook of manufacturers is enterprising and alert.

The section was seriously affected by the slump in 1921 and found revival difficult, as it had to face not only the world decline in demand, but acute foreign competition on the home as well as the export markets. The safeguarding duty, however, checked its decline on the home market; but its exports, which had fallen from the abnormal peak of £119,528 in 1920 to £3,493 in 1925, continued to decline. Its main interest has always been concentrated on the home market, which it shared with Swiss and German productions; it is estimated that direct and indirect exports in 1937 did not exceed 15 per cent of production.

In the first two years of the war, production, and particularly exports, soared under the stimulus of the export drive. But after Lend-Lease reduced the need for foreign currency, allocations of yarn were no longer made since the section was unable to produce any essential goods. A few firms, drawing upon their stocks of yarn, continued throughout the war on a greatly reduced scale: the remainder closed entirely or turned to other war activities. The closed factories are now in production again and making vigorous efforts to build up their labour force.

CHAPTER VII. BARMEN OR BRAID LACE SECTION

THIS section consists of one big and two small firms, situated in Loughborough, Beeston and Slough. They employ small circular machines based on an invention of the Frenchman Malhere, an improved form of which was patented by his sons in 1894 in France, Germany, the United Kingdom, United States and Italy. Though a factory was set up in England by Birkin & Co., the firm who acquired the British patent rights, the machine was chiefly exploited and developed in Germany, and the three firms now in operation all started their business with two-thread German machines. A considerable proportion of machines now in use, however, are of English manufacture and embody improvements on the German machine covered by British patent rights.

* The standard history and account of the machine embroidery industry is E. Iklé: *La Broderie Mécanique* 1828–1930 (Paris 1931).

The machine can produce lace only of narrow width; and since its rate of production is very slow there is a tendency to concentrate on coarser types of lace.* Since it reproduces the movements of the maker of hand-made bobbin lace, however, its products closely resemble hand-made lace, and some of them are remarkably beautiful. The machine has also proved highly successful in the production of certain types of narrow fabrics. Mass-production methods are employed in working these machines, and a three-shift system was general a few years before the war. The number of such machines at present in this country is some 1,150. The total number of workers employed before the war was some 300 of whom about 50 per cent were men. A considerable part of the labour and capacity was then employed, however, on the production of certain types of narrow fabric.

The British industry is small compared with those established in Germany and some other European countries to which the German machines were exported, and German and Italian competition and the protection of local industries by tariffs made export very difficult before the war. Before the imposition of the import duty, dumping by German producers also threatened the industry in the home market. This disadvantage was, however, eliminated by the duty and the section believes that, if it can obtain sufficient material to resume work in mass-production lines, it can keep costs sufficiently low to compete with its European rivals, some of whom have already resumed production.

The efficiency of this section of the industry appears on the whole to be high; premises we visited were good, and conditions very satisfactory except for the noise of the machines which may be unavoidable.

CHAPTER VIII. WARP SECTION

THE warp lace machine, invented about 1775, is the only lace machine still in use in this country to be derived from the stocking frame. Its essential characteristic is that it employs barbed needles in place of bobbins and carriages, and the resultant stitch is knitted, not twisted.

The products of the warp lace machine include narrow insertions and edgings similar to those made on the Leavers machine for trimming garments, braids, curtain nets, and a variety of trimmings for household goods, etc. Warp laces, like barmen laces, are commonly coarser in gauge than other types of lace. Hair-nets and snood nettings are made on the versatile warp knitting machine, which can also produce a variety of fabrics of a lace-like structure and pattern; the remainder of its products belong more properly to the warp knitting section of the hosiery industry.

The general problems of this section do not differ from those of other machine-holding sections of the lace industry except that blacklead is not used as a lubricant. As so many of the plants are mixed, questions of premises and welfare require to be considered in relation to the factory as a whole. The only problem peculiar to this section is the impossibility of renewing its warp lace machines, or of securing any servicing other than can be carried out by its own staff, since it is understood that the manufacture of warp lace machines, and, what is more serious, of spare parts, has ceased.

* At Le Puy-en-Velay the delegation of the Working Party visiting France saw some extremely fine lace being produced on Barmen machines. The Barmen industry in France is on a considerable scale.

This section is small and less homogeneous than the other machine-holding sections, and it is the exception for a firm to specialize in warp production. More often it is combined with warp knitting, hosiery or other types of lace production. Some warp lace is sold in the brown, but most firms also sell to the wholesale and retail trades, procuring dressing and occasionally finishing on commission. It is more common, however, for the machine-holder to do his own finishing.

The detailed information provided by other sections of the lace industry is lacking here. Only half of the firms replied to a request for information, and the gaps in the returns which were made, occasioned by the lack of records, made them of little use for our purpose. We realize that most firms in this section are faced with the peculiar difficulty of providing information about a part of their production only; but as we have said above, our ability to make a constructive analysis depends upon our being provided with adequate statistics, and the poor response here is disappointing.

To some extent the gap has been filled by information of a more general kind provided by the Warp Lace and Net Manufacturers' Association, who have included in their survey the warp hair-net manufacturers who do not belong to the Association.

There are at present 15 firms of which seven make warp lace only, five hair-nets only, and three have both types of production. Four additional firms, all specializing in warp lace, are known to have been in existence in 1937 and to have since ceased business. The number of warp lace machines is about 100 and of raschel machines, which are used for making hair-nets, between 50 and 60. An analysis has been made in Table 53 of two-thirds of the warp machines.

TABLE 53

ANALYSIS OF WARP LACE MACHINES BY GAUGE* IN 1923, 1937 AND 1946

Gauge:	Under 9	9	10	12	14	16	18	20	Over 20	Total
1923† .		35		16			45		19	115
1937 .		6	26	11	18	4	5	1	—	71
1946 .		6	23	11	14	3	—	3	—	60

All these are driven from a common source, except for one of the 14-point and two of the 20-point machines shown for 1946. The figures are clearly incomplete, and too much weight should not be attached to them. They do, however, seem to show a tendency to concentrate on the most popular gauge, 10-point, at the expense of the finer gauges. Sixteen machines, of which 13 are finer than 10-point, are recorded as having been scrapped or destroyed since 1923, and have been replaced by two 10-point machines. Ten machines, i.e. one-sixth of the 1946 stock, have been reconditioned since 1923.

The number employed in 1937 was between 250 and 300, of which just under a quarter were engaged on hair-net production. In 1946 their number was about 200, of which more than half were on hair-nets. The present labour in aggregate

* Gauge means the number of needles in one inch across the machines.

† The 1923 figures of machines are taken from information collected from nine firms for the 1923 Inquiry.

amounts to 70 or 80 per cent of pre-war; but while the number of workers employed on hair-nets has increased by rather more than 25 per cent, those on warp lace are only half of pre-war.

It is estimated that of a total yarn consumption in 1937 of about 540,000 lb., 480,000 lb. was cotton yarn for warp lace, and the remaining 60,000 lb. rayon for hair-nets. Cotton is not used for hair-nets, and little or no rayon was being used before the war in warp lace.

The allocations for the period November 1946 to February 1947 run at an annual rate of 521,000 lb. of cotton, of which one-third is for export and the remainder for utility curtain nets for the home trade, and 180,000 lb. of rayon for lace for export and for hair-nets, divided equally between home and export. The cotton allocation is slightly greater than the estimates of 1937 consumption and the rayon allocation is three times as great.

More detailed information has been given about the costs structure of the section. A sample analysis gives the following result:

TABLE 54

ANALYSIS OF SELLING PRICE OF WARP LACE IN THE BROWN IN 1937

	% of brown selling price
1. Cost of materials	50·6*
2. Cost of labour	24·5
3. Conversion cost (including depreciation, rent, insurances, rates)	5·6
4. Production and selling overheads and profit	19·3
	100·0

It may be opportune to mention at this point one firm which, though it does not properly belong to the warp section, has perhaps more affinities with it than with any other section. This is a small plant of machines of German origin brought over from France in the spring of 1937 and established in the London area. We understand that these are the only machines of the type in this country, though there is thought to be a considerable number in France. The machines are narrower than other lace machines; they have a row of barbed needles like the warp lace machine, but produce a crochet stitch and not a knitting stitch. The yarns used are coarser than those employed in any other section of the lace industry. The products are consequently heavier and include curtain panels and brise-bise, chairbacks, etc., and edgings and fringes for household goods. The potentialities of this type of production cannot be evaluated since the plant was not running for the greater part of the war. Production is now being resumed and considerable energy is being shown in training labour and arranging for local production of spare parts, and even of new machines.

CHAPTER IX. THE DYEING AND DRESSING SECTION

THE Dyeing and Dressing section is composed of those firms who handle on commission the products of the various machine-holding sections of the industry. It includes certain firms over which plain net machine-holders have financial

* The cost of material varies with the type of product, and this figure may be on the high side.

control and which act as their dyeing and dressing departments. These firms handle some of the products of the Plain Net section, nearly all the products of the Lace Furnishings section, and all the products of the Leavers section with the exception of a considerable part of the hair-net production. The processes consist of bleaching or dyeing the products and dressing them: in the case of Leavers and plain net products on the flat frame, and in that of lace furnishings products by the use of stenters or on the flat frame. When handling plain net and Leavers products, their activities end at the millfold stage,* later processes being carried out by the finishers who have purchased the products from the machine-holders; when handling products of the curtain machine, in many cases the dressers carry out on behalf of the machine-holders the final finishing processes as well.

We have visited the plants of several such firms, have had the benefit of the Trade Associations' views, and have also seen plant operated both in the Plain Net and Lace Furnishings sections by machine-holding firms who process their own products. Statistical material has been made available to us through the Associations and is based on the returns of all the firms in the section with the exception of one non-member operator and a few firms normally not concerned with the dressing of lace products but who sometimes do work for the Lace Furnishings section. The Dressing section of the industry is in a somewhat different position from the other sections with which we are concerned. It forms part of a big and widespread bleaching, dyeing and dressing industry which serves the needs of the various textile industries of the country, and, while certain of its problems are peculiar to lace production, others are general to the textile industries as a whole. It has not, therefore, been possible for us to arrive at an informed judgement on the general efficiency of this portion of the Dyeing and Dressing industry, since to do so we should need to make a survey of other portions which fall outside the scope of our inquiry. We have had to limit our investigation in a somewhat arbitrary manner to those problems which are peculiar to the lace industry, or to aspects of wider problems as they affect the lace industry. Our conclusions are in consequence limited in range and in some cases tentative.

TABLE 55

COMPOSITION OF THE DRESSING SECTION 1923, 1937 AND 1946

Date	Total		Proportion in Scotland	
	Firms	Establish-ments	Firms	Establish-ments
In operation in 1923	27	30	5	5
In operation in 1937	21	24	5	5
In operation 31 March 1946 .	15	16	3	3
Closed at 31 March 1946, but likely to reopen . .	6	6	2	2
Total for 1946 .	21	22	5	5

*i.e. When the web after leaving the machine has been bleached or dyed and dressed but has had no further finishing processes applied to it.

The composition of the section is shown in Table 55, the firms and establishments being situated in the Nottingham area unless otherwise stated.

Most of these firms are fairly large, but it is not practicable to express their size in terms of lace production, since most of them also handle other textile products, e.g. hosiery and knitted fabrics. Eight of the firms concerned, for instance, employ the following percentages of their workers on lace products: 28, 41, 50, 57, 62, 64, 69, 75.

The capacity of the section can best be expressed, in the case of flat frames in terms of the square yardage it can handle at any time, and in that of stenters in terms of the linear yardage* which can be handled in a 48-hour week (see Table 56).

TABLE 56

DRESSING CAPACITY 1923, 1937 AND 1946

(*a*) *Stenter*

Date	No. of Stenters in use		Total	Total Stenter-dressing Area Per Week (on basis of 20 linear yards per minute)
	Nottingham	Scotland		
1923 . .	27	6	33	1,900,800 linear yards
1937 . .	27	9	36	2,073,600 „ „
1946 . .	24	9	33	1,900,800 „ „

(*b*) *Flat Frame*

Date	No. of Flat Frames in Use		Total	Maximum Flat Frame Dressing Area
	Nottingham	Scotland		Square Yards
1923 . .	87	3	90	45,772
1937 . .	89	10	99	45,735
1946 . .	91	10	101	47,117

This capacity is estimated to have been employed only to some 80 per cent in 1937 calculated on the 48-hour week customary in this section, and this may be an over-estimate since in the case of stenter-dressed goods there is the possibility of some substitution of capacity as between lace and other products. If this capacity be compared with our estimate of the likely output of the machine-holding sections, it would seem to be ample for the needs of the industry. As in the machine-holding sections, however, the labour situation seems much less satisfactory.

The present labour force is contrasted with that of 1937 in Table 57.

* The figures quoted for this can be only approximately accurate, since the total may be affected by the width, length and weight of the goods processed.

TABLE 57

EMPLOYMENT IN THE DRESSING SECTION 1937 AND 1946

Occupation	MALE			FEMALE		
	1937	31 March 1946	1946 as % of 1937	1937	31 March 1946	1946 as % of 1937
1. Dyers, bleachers, dollymen and dippers	557	161	*29*	44	14	*32*
2. Dressers:						
(*a*) Stenter hands	81	14	*17*	180	36	*20*
(*b*) Flat frame hands	43	31	*72*	646	268	*41*
3. Examiners, menders and other finishing hands, excluding machinists	26	—	—	629	177	*28*
4. Machinists	1	—	—	292	32	*11*
5. Other productive grades, stokers, van drivers, etc.	412	171	*41*	111	22	*20*
6. Office staff including working directors, departmental managers and working proprietors	93	34	*37*	82	44	*54*
Total	1,213	411	*34*	1,984	593	*30*

As in other sections, the present reduced labour force is unbalanced in its age composition. The analysis of the workers employed at 31 March 1946, given in Table 58, shows an undue proportion in the older age groups.

TABLE 58

AGE COMPOSITION OF LABOUR IN THE DRESSING SECTION 31 MARCH 1946

MALE				FEMALE			
Under 18	18–40	41–65	Over 65	Under 18	18–40	41–60	Over 60
28	134	214	35	36	280	223	54

The 1946 figures are of interest chiefly as an indication of the low level of activity to which the industry was reduced during the war. The difficulties of building up a labour force from this low level, however, and on the basis of so unsatisfactory an age composition, must be recognized. On the most favourable assumptions the section can hardly hope for a higher proportion of its pre-war labour to be available for it than for the other sections of the industry. As against

a total of 3,197 in 1937, it would seem unwise to assume a post-war total of more than some 2,400. The problem of the section would seem to be how to handle an increase of anything between 10 and 30 per cent over the 1937 volume of work with 75 per cent of the 1937 labour force. The present abnormally low proportion of stenter-hands and machinists, who are required mainly for handling lace furnishings products, reflects the wartime diversion of these goods from the lace dyers and dressers, who were not equipped to provide the special finishes which were needed for the bulk of the nettings produced by the Lace Furnishings section for war purposes. The task of building up the labour force is therefore likely to be particularly difficult on this side, and already even at the present reduced level of production, the shortage of workers at the finishing end is holding up work.

It is true that in this, as in other sections, the 1937 labour force cannot be assumed to have been fully employed. It is clear, however, that neither full employment nor the minor labour economies made practicable by the change from a period of labour redundancy to one of labour shortage, is likely, in itself, to be sufficient. Measures for economizing the use of labour and for increasing its productivity by improvements in plant and factory organization have been, accordingly, our first consideration. Improvements in the types of plant generally employed appear most likely to be possible in the dyeing processes and in the dressing of plain net and Leavers products at present carried out on the flat frame. The Delegation of the Working Party visiting France saw in factories in Calais and Caudry types of large stenter installed to do the work of the flat frame. No economies in labour or cost were, however, claimed for them, and though they had the advantage of providing more pleasant conditions of work for the operatives engaged on them, they are clearly not the answer to our problem. So far as stenter-dressing plant is concerned, nine of the 33 stenters in use have been installed since 1923. We are not in a position to assess the possibilities of marked technical advance in this plant whether peculiar to the lace industry or by adaptation from the dressing of other textile products, but the matter might repay investigation.

Besides the problem of making the best use of the labour available, this section has, like others, to consider means of recruiting and training workers, and of making the conditions of work sufficiently attractive to compete with those offered by other industries drawing on the same labour market. The means do not vary greatly from those indicated for other sections.

Our attention has been directed to two general questions concerning the section. The first of these is the comparative efficiency of dressing by specialized firms on commission and of dressing facilities under the control of the machine-holders. To express the contrast as one between horizontal and vertical organization of production would be an exaggeration. Though there are cases in which machine-holders have set up dyeing and dressing departments in their own works, this is less common than an arrangement whereby a machine-holding firm has taken over financial control of a dyeing and dressing firm which undertakes its dyeing and dressing for it. In most cases such firms also dress the products of other firms on commission, though the greater part of their capacity is occupied on work for the controlling machine-holding firm. In most cases, too, machine-holders controlling such firms have some of their products processed elsewhere. This vertical tendency has, of recent years, been adopted by the majority of the large plain net manufacturing firms, who maintain that they have

thereby effected considerable economies. One firm in the Lace Furnishings section has also recently undertaken the dressing of most of its products, and expresses satisfaction at the results. In France the only firm in Caudry (curtain and plain net machine-holders), at present adopting these methods, expressed the same satisfaction. The practice has always been adopted by some producers of hair-nets on Leavers machines. In the U.S.A. it is common in all sections. In the United Kingdom, however, apart from these instances, the employment of the services of the specialized commission firms has been universal, and in France is understood to be general in the Leavers industry of Calais and the curtain industry of St. Quentin.

We do not feel competent to express an opinion on this question of organization and confine ourselves to the following comments. It is not easy to see any theoretical explanation of the advantages which are said to have accrued from integration. They cannot be the result of factory organization, since in a number of cases the process is carried out in a separate establishment. It is possible that, under certain conditions, firms of a substantial size, whose dressing processes are well-standardized, may derive some benefit, not only from being able to plan their dressing capacity in relation to their machine-holding capacity, but also in savings in overheads and direct labour costs as against those incurred by a commission firm which has to handle a wide variety of goods. In an industry so fluctuating as the lace industry, however, such economies would be likely to be considerably reduced over a period of time, and the commission dressers, with their interests in various sections of the lace industry and in other textile products, are less likely to feel the full weight of a serious depression.

It is also held by some machine-holders that they can ensure better finish by these means. If so, there is clearly no technical explanation of the fact. It is no doubt inevitable and probably healthy that there should be friction from time to time between the dressers and their customers, which serves to draw attention to the need for progress and to deficiencies on both sides. A fixed schedule of prices was established some years ago, partly on the ground that the standard of finish was being threatened by individuals pursuing a policy of indiscriminate price-cutting. In these circumstances enterprise and a sense of responsibility is necessary on both sides to ensure progress and maintain standards. On the one hand a dresser pursuing a short-sighted policy of economy in finishing materials, or on the other a machine-holder or finisher demanding excessive stretching of his web, can seriously affect the standard of production.* In general the opinion seems to be held by those capable of forming a judgement on the subject, that, while the general standard of British dressing is markedly higher than that found in certain lace and embroidery producing centres, it fails to reach the level achieved in some others.

In so far as machine-holding firms are correct in believing that it is to their advantage to make their own arrangments for processing their products, whether it be an advantage of price or of quality, it would seem that the commission dressers are not pressing home the advantages of their large-scale organization, and the situation would seem to require their serious attention, particularly in view of the rise in their costs which must inevitably follow the withdrawal from them of long runs of goods requiring well-standardized processes.

* The dressers also complain that very short dyeing runs and a tendency to ask for unduly quick return of goods, by adding to their difficulties in organizing production, militate against the best results both in quality and quantity.

The second general question, that of the cost of the dyeing and dressing processes and the price which the dressers charge for them, is a matter of considerable importance to the industry as a whole in view of the significant proportion which this forms of the price of the finished product. A breakdown of dressing costs in 1937, based on returns from 83 per cent of the trade, including the dressing departments of integrated firms, is given in Table 59.

TABLE 59

PERCENTAGE COSTS OF DRESSING IN 1937

	%
Direct wages costs . .	44·5
Material costs . . .	18·0
Fuel and power costs . .	9·1
Overhead costs and margin .	28·4
	100·0

It is clear that an economy in direct wages, such as might follow a reduction in the number of workers as a result of the elimination of the flat frame, or a reduction of overheads would have an appreciable effect on dressing costs and on the minimum charges which are fixed by the Lace Curtain Dyers and Finishers' Association and the Lace and Net Dressers' Association. We believe that such a reduction would be of material assistance to the industry.

On the important question of how to achieve the highest standards of dyeing and dressing, it is essential that serious thought be given, and if necessary concerted action be taken, by the dressers and the machine-holding and finishing sections concerned to the improvements to be aimed at and the standards of achievement to be set.

CHAPTER X. THE FINISHING SECTION

THE finishing firms constitute an important and characteristic section of the industry, though one difficult to describe by any simple formula, since at the same time they specialize in the carrying out of certain industrial processes (drawing, scalloping, clipping, mending, folding, hair-net threading, carding, packing, etc.) and undertake a varying range of distributive activities. Unlike the dressers they act, almost without exception, not as commission houses but as principals, purchasing goods in the brown from the machine-holder. The account of them which follows, based on returns to the three Trade Associations concerned, must be read with certain considerations in mind. The considerable number of firms making returns in the finishing section immediately attracts attention. The fact is no doubt worthy of note, but the returns somewhat exaggerate it. In the first place there is in them an element of double-counting, since firms with interests in more than one type of finishing made returns to

more than one associaiton. The degree of overlapping is indicated by the fact that of the 130 members of the three associations of finishers, 28 are members of more than one association, and the total number of firms is 102. In the second place, in a number of cases there is a degree of integration between the firms which does not appear in the returns, two or more firms in several cases being under common control, while various kinds of grouping and degrees of absorption may be masked by the retention of the original names of the firms. Among the members of the Lace and Net Finisher's Association there are five known cases in which two firms are under common financial control and two known cases in which three firms are under common financial control.

The finishers are organized in three associations representing the types of product they handle. Two of these are somewhat specialized.

The Association of British Plain Net Finishers has a membership of 33 firms; it includes all but one of the big plain net machine-holders, who are members by virtue of their finishing departments. The finishing processes are simpler than in the case of other products, and do not lend themselves to the use of outworkers. Of the 33 member firms, 29 made returns for the use of the Working Party, of whom one was not in existence in 1937, and one could more properly be classed among the lace finishers. The size and structure of the remaining 27 firms can be seen from Table 60. A breakdown of the finished selling price of representative plain net products is given in Table 61.

TABLE 60

ANALYSIS OF PLAIN NET FINISHERS BY SIZE OF FIRM, 1937

	Less than 10 Inside Employees	10 or more Inside Employees	All Firms
(*a*) *By No. of Employees*			
No. of firms	10	17	27
No. of inside employees . .	50 *	432	482†
Minimum of inside employees .	1	10	—
Maximum of inside employees .	9	91	—
Average of inside employees .	5½	25	19
No. of outworkers (on basis of 20s. per week)‡	3 *	7	10†
(*b*) *By Selling Value*			
Net selling value . . .	£93,882	£618,260	£712,142
Average turnover . . .	£ 9,388	£ 36,368	£ 26,376

The Hair-net Finishers' and Exporters' Association also represents a small and specialized part of the section. It has a membership of 11 firms, some of which have gone into production since 1937, most of them after the outbreak of war. The three big integrated machine-holders producing these goods are also members. Only 7 of the 11 firms made returns for our use, and not all of these

* 9 firms. † 26 firms.

‡ Calculated from the total wages bill of out-workers, assuming the average out-worker to receive 20s. a week.

TABLE 61

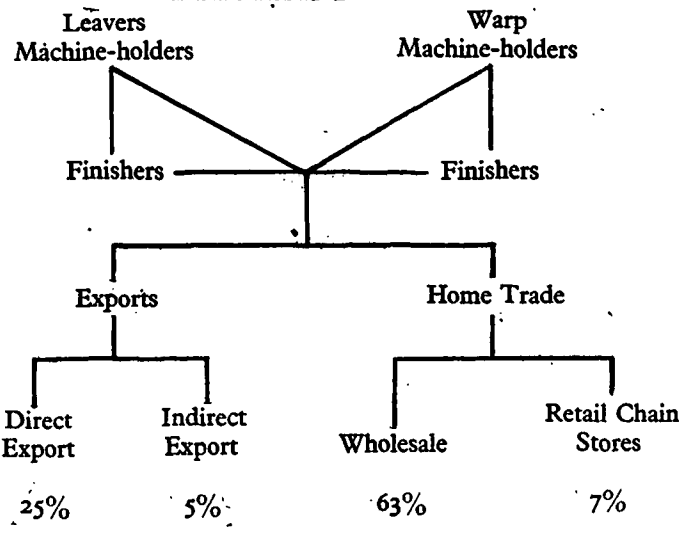
BREAKDOWN OF 1937 SELLING PRICE OF REPRESENTATIVE PLAIN NET PRODUCTS

	Cotton Mosquito Net	Rayon Net	Cotton Bobbin Net*
	Pence per square yard	Pence per square yard	Pence per square yard
1. Brown cost	2·86	4·02	4·68
2. Dyeing and dressing	0·54	0·95	0·52
3. Direct labour	0·11	0·14	0·18
4. Finish, boxes, paper, etc.	0·05	0·08	0·05
5. Patterning costs	0·01	0·01	0·01
6. Selling costs, overheads and profit	0·60	0·91	0·98
7. Total finished selling price per square yard	4·16	6·11	6·42

were in production in 1937. The figures proved too incomplete to be used for purposes of analysis. Diagram 2 illustrates the part played by the hair-net finishers in the pre-war distribution of hair-nets, the percentages of total production by value quoted representing no more than estimates.

The number of hair-net finishers increased during the war on account of the entry into hair-net production of machine-holders previously producing other

DIAGRAM 2



* Fine gauge net, usually of finer yarns, and including sandfly and dress nets.

forms of Leavers and warp products. The conditions which called forth this increase were largely temporary, and some retraction is likely when alternatives are again available (e.g. nets of human hair) and French competition revives.

The Nottingham Lace and Net Finishers' Association, the organization of the lace finishers, represents what is at once the most varied and most numerous part of the Finishers' section. The association's 86 members make up the main bulk of what is commonly known as the Nottingham Lace Market. 68 of the 86 members made returns for our use; of these 65 were in existence in 1937, but 6 of the returns were incomplete. The evidence used in Table 62 is, therefore collected from 59 firms. These firms differ greatly in size and function.

TABLE 62

ANALYSIS OF LACE FINISHERS BY SIZE OF FIRM, 1937

	Less than 10 Inside Employees	10–50 Inside Employees	More than 50 Inside Employees	All Firms
(a) By Number of Employees				
Firms	29	25	5	59
Number of inside employees	154	538	572	1,264
Minimum of inside employees	2	10	56	—
Maximum of inside employees	9	45	274	—
Average of inside employees	5	21½	114	21
Number of outworkers (on basis of 20s. per week)	93	222	106	421
Minimum of outworkers per firm	—	—	—	—
Maximum of outworkers per firm	12	50	76	—
Average of outworkers per firm	3	9	21	8
(b) By Selling Value				
Net selling value	£240,706	£520,660	£370,576	£1,131,942
Average turnover per firm	£8,300	£20,826	£74,115	£19,185

These figures may be compared with the returns to the 1935 Census of Production, which give 39 lace warehouses as employing 10 or more inside workers. They also compare with previous information from the trade which speaks of 29 'one-man firms' and of 12 big firms each of which may employ 200 or 300 workers in its warehouses as well as numerous out-workers.* A 'one-man firm' may well cover a firm with a few employees so that there appears to be no serious discrepancy at the lower end of the scale. As for the big firms, we know that one Leavers finisher did not make a return to the Working Party, that there are 4 finishers who do little Leavers finishing but are members of the Nottingham Lace and Net Finishers' Association, and that there are 2 other finishers who might have been included, although they do little, if any, Leavers finishing, and are not members of the Association. The numbers of small and big firms might be reconciled in this way. But, to judge from the employment inside the

* Wells, *op. cit.*, p. 81.

warehouse returned by the 5 firms in Table 62 a firm of 200–300 workers would seem definitely to be too large. Our estimate of total employment in Leavers finishing may thus be a little low, but not seriously out.

The industrial processes carried out by the lace finisher are easily understood; his commercial activities are more complex, and may vary considerably from firm to firm. Some finishers specialize in the provision of goods for certain markets (e.g. before the war some firms specialized in assortments for the South American trade through exporting houses), others concentrate on special lines of goods (e.g. lace and embroidery required for the neckwear and handkerchief manufacturers); others carry a wide range of goods and deal on a variety of markets. In general, it may be said that the finisher's functions as a distributor include the following activities: he gets from machine-holders ranges of patterns suitable for one or more parts of the trade, with which he approaches wholesalers, makers-up and exporters or (if he has his own overseas agents) the buyers on overseas markets. Against, or in anticipation of, their orders he makes his purchases. He frequently holds large and varied stocks, and displays a wide range of goods. He may play a considerable part in the production policy of the Leavers section through the orders he places and the designs he makes or has made for him by trade designers. He also serves a purpose in a section where

TABLE 63

BREAKDOWN OF 1937 FINISHED SELLING PRICE TO THE WHOLESALER OF REPRESENTATIVE LEAVERS PRODUCTS*

	(*a*) Low grade	(*b*) Average	(*c*) High grade
	Pence per square yard	Pence per square yard	Pence per square yard
1. Brown cost . .	9·97	20·11	70·04
2. Dyeing and dressing .	2·09	2·47	2·95
3. Direct labour . .	2·15	5·01	11·19
4. Finish, boxes, paper, etc. . . .	·24	·51	1·08
5. Patterning cost . .	·31	·85	2·29
6. Selling costs, overheads and profit . .	2·86	6·93	42·95 †
Total . .	17·62	35·88	130·50

*The three groups are the costs not of single typical products, but the unweighted average costs of a range of products. Since there is a wide variation in the widths of the samples taken—the narrowest is a ½″ val. and the widest a 36″ flouncing—the price taken for each sample is the proportionate price for one square yard.

†The samples in group (*c*) are sold direct to the retailer and the selling costs and overheads include the extra cost of performing part of the wholesale function. It is estimated that this extra cost amounts to about 10 per cent of the figure in item 6. Were these goods to be sold to the wholesaler, item 6, selling costs, overheads and profit, would be reduced to about 38½d. and the selling price to the wholesaler comparable with the prices quoted for groups (*a*) and (*b*) would be about 126½d.

the small machine-holder is prominent, by giving prompt payment against delivery of goods in the brown.

We asked for a breakdown of the finished selling price of representative products comparable with the breakdown of the brown price provided by the Leavers machine-holding section. This breakdown is given in Table 63, and has been based on the same products as in Table 19.

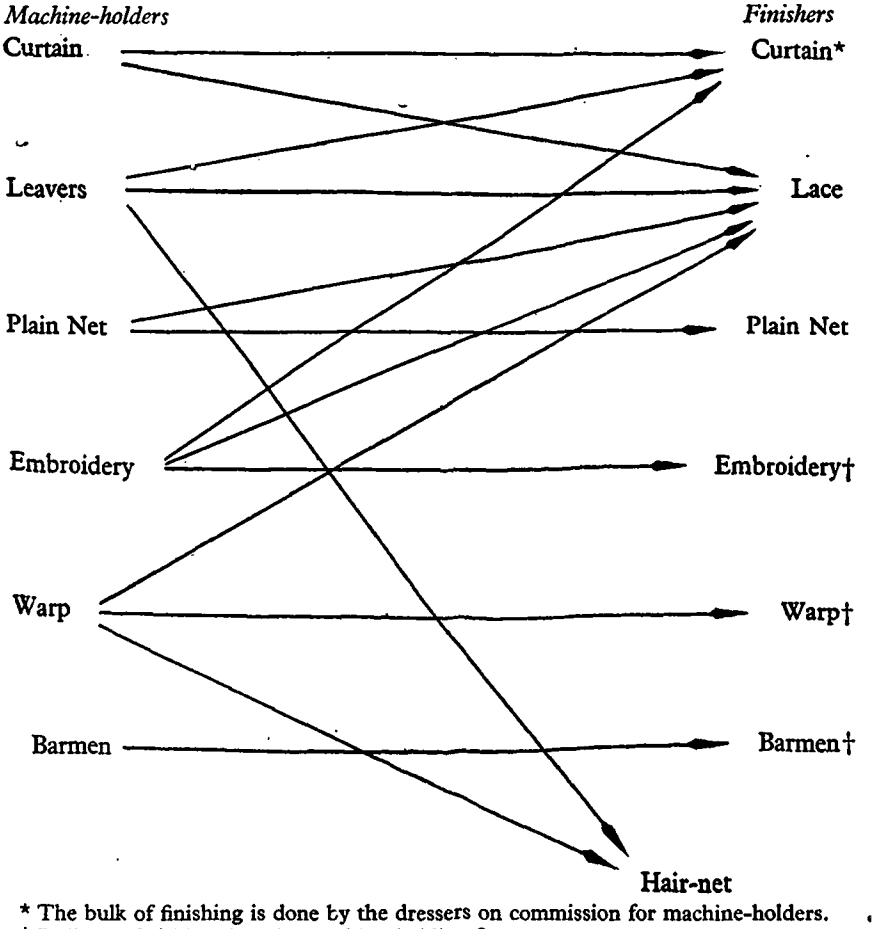
General

Diagram 3 serves to show the relation between machine-holders and finishers throughout the industry as a whole and the wide variety of lace products handled by the lace finishers. The arrows show the direction in which goods in the brown pass from machine-holder to finisher. There is also a considerable interchange of finished products among finishers for use in conjunction with other products.

Aspects of the finishing section which merit special attention arise under the two heads already mentioned; their problems as producers and their position as distributors.

DIAGRAM 3

RELATIONS BETWEEN MACHINE-HOLDERS AND FINISHERS



* The bulk of finishing is done by the dressers on commission for machine-holders.
† Indicates finishing done by machine-holding firms.

Under the first of these heads the problem is primarily one of how to achieve a labour force adequate to handle, not only the pre-war level of work, but the greater volume to be expected when the machine-holding sections are in full post-war production. Both plain net and lace finishers had on 31 March 1946 a labour force much below that of 1937, the lace finishers, as might be expected, having suffered the more seriously. The hair-net finishers, on the other hand, probably slightly increased their employment on account of the wartime increase in output of hair-nets and the entry of new firms. Table 64 gives the comparative situation in the case of the lace and plain net finishers in 1937 and at 31 March 1946. Information as to the age distribution of the labour in 1937 is not available. Table 65 indicates the position at 31 March 1946.

TABLE 64

EMPLOYMENT IN THE FINISHING SECTION, 1937 AND 1946

	Lace Finishers		*Plain Net Finishers*	
	Male	Female	Male	Female
Inside Employees				
1937	231	1,037	95	387
31 March 1946	139	555	73	285
Outworkers (on basis of 20s. per week)				
1937	—	423	—	10

TABLE 65

AGE COMPOSITION OF THE WORKERS IN THE FINISHING SECTION 31 MARCH 1946

	Under 18	18–40	41–65	18–65 not separated	Over 65
(*a*) *Men*					
Lace finishers	3	20	95	—	21
Plain net finishers	4	14	35	6	14
(*b*) *Women*	Under 18	18–40	41–60	18–60 not separated	Over 60
Lace finishers	51	143	252	24	85
Plain net finishers	44	93	85	47	16

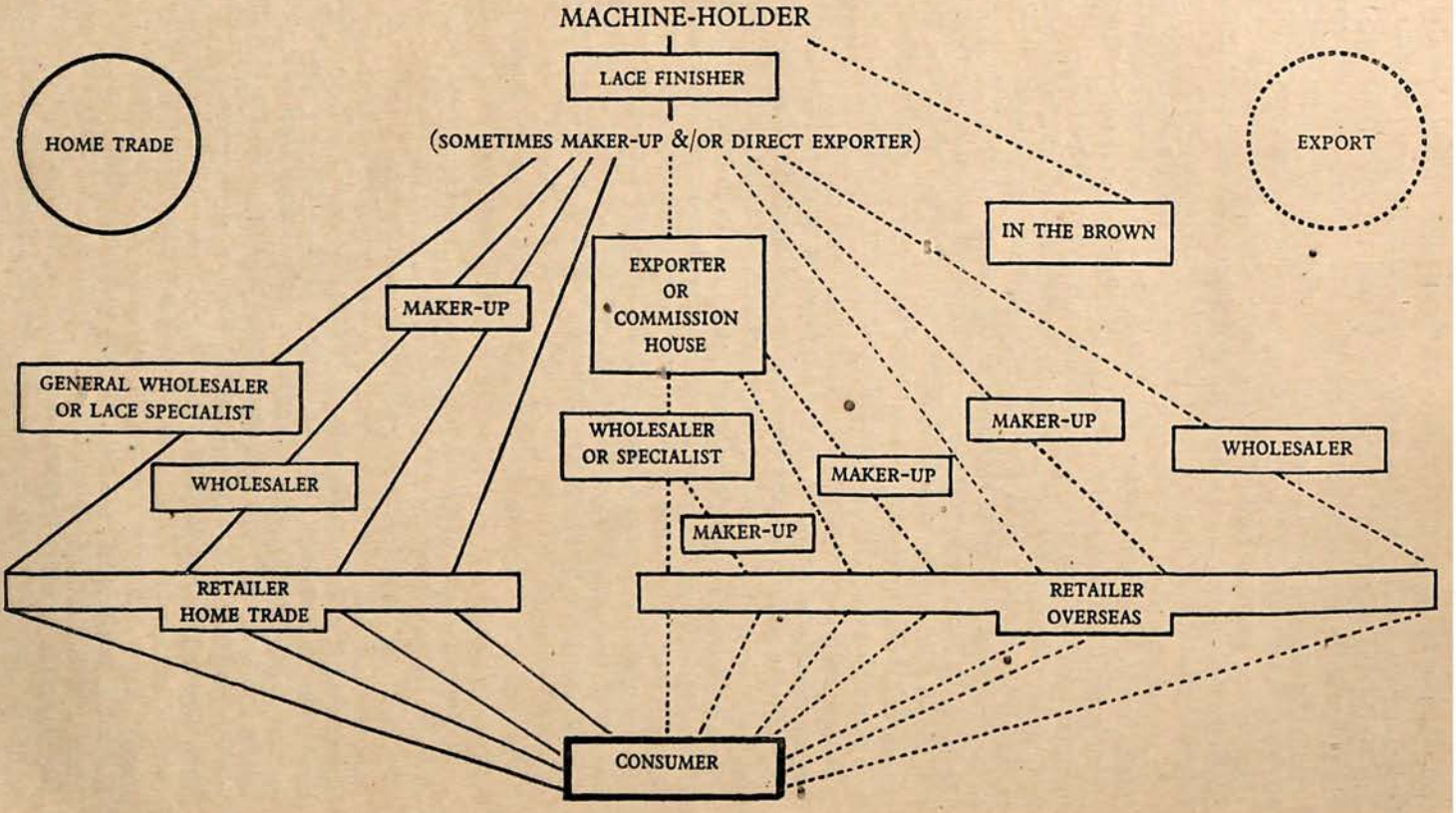
Most of the work done in the finishing processes is done by hand, and the possibilities of substantial economies in labour do not appear good. Clipping machines for the simpler clips appear, however, to be widely used in the U.S.A., and are also employed to some extent in Calais. Mechanical or chemical aids to the jennying, drawing and scalloping of laces do not seem beyond the realm

of possibility, and it is suggested that under the changed conditions of labour supply all possibilities of increased mechanization should be carefully investigated. At the same time, as indicated in Chapter XIII below, every means should be taken for making conditions of work as attractive as possible; while, in the field of recruitment of labour there would seem to be a strong case for organized investigation, in consultation with officials of the Ministry of Labour and National Service, into the possibility of making further use of untapped resources of immobile women workers in mining and other districts, where work could be done preferably in local workrooms under supervision. Further it is not clear that all steps have been taken to make full use of part-time women workers, and this subject, too, would repay investigation.

The question of the finishers' distributive activities is different. The position of the finisher, particularly in the Leavers section, is a peculiar one which owes much to the traditions of the industry. It has at present few parallels in the lace industries of other countries, and has ceased to be generally applicable to the other sections of the British industry. In the U.S. Leavers industry the fully integrated firm prevails, while in France, though the finisher formerly held a position similar to that which he still enjoys in England, he has for many years been almost entirely crowded out between the machine-holder on the one side and the wholesaler and exporting house on the other. This process may have been facilitated by the fact that a very high proportion of French output goes to the one market, the U.S.A. In England the lace finisher has been subject to some criticism from two points of view. One of them, reflected in the U.S. Tariff Commission Report of 1934, is *a priori* and is based on the assumption that the integrated firm is necessarily the most economical unit, and that any division of processes between specialized firms is uneconomic as involving 'extra profits'. This is not necessarily so since the processes must be carried out at a profit in the long run, whoever gains the profit. The position of the finisher is also criticized, however, on more practical grounds. His value as an intermediary under present conditions is sometimes challenged, and it is suggested that not only is he an unnecessary link in the chain of distribution, but that he may be an obstacle dividing the machine-holder from the purchaser of his products and hindering his adjustment to the demand of the market.

While agreeing that there are cases in which the distributive functions of the finisher are unsatisfactorily carried out, we do not see any reason to believe that his rôle in this section of the industry is at an end. There would seem, in the first place, to be no evidence of a tendency to integration within the Leavers section beginning at the machine-holding end, which might result in his disappearance. Indeed, insofar as there are any signs of integration, they appear to initiate with the finishers themselves, some of whom exercise financial control over machine-holding firms. In 1937, of 65 lace finishing firms 54, the great majority, were concerned only with finishing, but finishing firms had interests in four dressing plants, seven Leavers plants, three plain net plants, five warp lace plants, four curtain plants, six embroidery plants and one Barmen plant, the same firm having sometimes an interest in several different types of plant. It is doubtful, indeed, whether these facts are the result of anything which can be called a trend; the circumstances in which finishing firms acquired these interests seem often to have been accidental. It is possible, however, that in a period in which demand tends to outstrip supply such a trend may become apparent; and, if there are no signs of the finisher being eliminated by integration initiated by the

DIAGRAM 4. DISTRIBUTION OF PRODUCTS HANDLED BY LACE FINISHERS



machine-holder, there is also no sign of his losing ground to the wholesaler and shipping house, as has happened in France. On the contrary, the distribution of lace by the wholesalers and the shipping houses appears to have declined during the period of the depression between the wars. The finishers have been concentrating on supplying the making-up industry, and have taken over increasingly the stock-holding function of the wholesalers and the work of direct export. Diagram 4 is intended to illustrate the various distributive channels through which the lace finisher passes the goods to the ultimate consumer, and shows the variety of distributive functions which the finisher carries out.

In an industry whose products are at once so varied and so specialized, and in which the average unit is so small, there is clearly place for a class of skilled entrepreneurs, and this is the place the lace finishers at present fill. Their problems are those common to wholesale distributors in many trades, and their usefulness to the industry depends on the success with which they solve these problems. We believe that in co-operation with the machine-holders they have an important part to play in the future of the Leavers section of the industry. We feel some doubt, however, how far the very small finisher is able to play his part except when he meets a highly specialized need. The very small finisher appears to have been declining in numbers over a period of years, and this decline is no doubt linked with the falling off of the interest of wholesalers and exporters in the lace trade between the wars.

Since insight and enterprise play so big a part in success in this occupation, there must always be room for the man of unusual ability and highly specialized skill, however limited the scope of his activities. The decline in the number of the smallest firms suggests, however, that in this, as in other industries, the very small distributor has found himself at some disadvantage. We believe that in general the very small finishers can best secure their own survival and serve the best purposes of the industry either by efficient specialization or by adopting methods of voluntary amalgamation; such methods can in many cases readily arise from their wartime grouping under the concentration arrangements.

CHAPTER XI. RELATIONS OF MACHINE-HOLDERS AND MACHINE-BUILDERS

OUR Report would be incomplete without some reference to the machine-builders and their relations with the machine-holders, their customers. Except in the case of a few big plain net firms who make some of their own machines and at one time made many more of them, the three main machine-holding sections obtain their machines from the small body of machine-builders in Nottingham. These firms enjoy a virtual world monopoly in the supply of Leavers, curtain and plain net machines. They also supply some, but by no means all, the auxiliary plant used by the industry, the rest coming from the Lancashire textile machinery industry and, to a small extent, from the United States and Switzerland. Some firms also build some of their own auxiliary machines. The machine-builders won this strong world position by the merits of their products, and there seems no reason to fear a challenge to their supremacy. As in the case of most manufacturers of textile machinery, they occupy much

of their resources in the production of replacement parts for the large, costly and extremely durable machines they build.

We have had the opportunity of visiting the factories of two machine-building firms and discussing problems with them. The Association of Machine-builders, however, though they answered briefly in writing certain questions we put to them, were not prepared to meet us. On the problems common to the lace industry and the machine-builders we were, in consequence, unable to gain the same insight into the machine-builders' point of view as we have into that of their customers, and we could form no valid opinion of the success with which the problems were being tackled.

We feel obliged, however, to put on record certain opinions we have formed.

1. The co-operation between the machine-builders and their customers, the main sections of the lace industry, is less close than could be wished, particularly perhaps in the case of the Leavers section. This is due in part, no doubt, to the fact that Leavers machine-holders have for a number of years not been buying new machines (the reasons are discussed above, pp. 39–40), though they have been buying replacement parts. The value of close liaison between these industries is self-evident, and its absence militates against mechanical progress. It is particularly to be hoped that the gap between them can be bridged, especially perhaps in the field of co-operative research, and in improving the arrangements for the servicing of machines.

2. There is a widespread belief among machine-holders that the builders are more interested in the extension of their export markets than in the supply of parts for the maintenance of the British industry. The machine-holders maintain that so high a proportion of the limited skilled labour force available is employed in preparing machines or parts for export that the urgent needs of the British industry for replacement parts are neglected. The machine-builders deny that this belief is correct. We believe that the best way in which suppliers and customers can combine to balance the conflicting interests of the home and export markets is by the specific allocation of a substantial portion of the machine-builders' capacity to meet the needs of the British industry so long as the present pressure on the resources of the former continues. A recommendation to this effect is made below (Recommendation 23).

3. There has been a very sharp rise in the price of all types of lace machines. We were informed that the cost of a new machine is 133⅓ per cent above pre-war level, and the machine-builders tell us that, on account of wage increases, decreased output per man-hour and higher costs of material, they do not consider that this price covers costs of production today. This increase is considerably above the rates of increase quoted in Appendix III of the Cotton Working Party report for the Lancashire textile machinery industry, and all possibilities of price reduction would seem to deserve the attention of the industry and the interested Government Departments. There can be no doubt that this heavy increase in the cost of installing new machinery is militating against re-equipment in all sections of the lace industry.

THE SALE OF SECONDHAND MACHINERY OVERSEAS

The sale of secondhand machinery to overseas lace-producing countries is a topic on which the interests of the lace industry and the machine-builders have also tended to diverge. Though overseas purchasers can procure such

machinery from other sources, most of the sales are by machine-builders who usually recondition the machinery before its despatch. In the past, during periods of depression in the industry, it has often been worth while for the machine-builders to sell machines abroad at derisory prices on account of the orders for replacement parts that are consequent on these sales. The result has been that certain overseas producers have equipped themselves with machines at very low cost and, though it cannot be said that the industries thus set up have flourished in such a way as to challenge British export trade, there has been a tendency to erect high tariffs to protect them on their home markets, even in cases where they cannot possibly provide the needs of more than a fraction of their market, to the detriment of British trade to these destinations. It is to be hoped that a more liberal tariff policy throughout the world will in future remove some of these obstacles to the free exchange of goods, or at least prevent additions to them.

At the present time, secondhand machines are still being exported, though no longer at derisory prices, and there is a new conflict of interests involved. The lace industry believes that the reconditioning of this secondhand machinery for export is taking up machine-building capacity at the expense of its own urgent orders for replacement parts. There is also some fear lest at present, when the delivery of new machines is so slow, secondhand machines of relatively modern type and in good condition are being sent out of the country, when British machine-holders would like to purchase them to replace older machines they wish to scrap. We should recommend the continuance for the immediate future of the provision whereby the British industry is informed, through the appropriate trade association, of any intended export of secondhand machinery, and the tightening up of the administrative arrangements for enforcing this provision, so that British machine-holders may have first claim on the machines in question if they so wish. The necessity of this provision in practice can best be judged by the degree to which advantage is taken of it.

Apart from this we believe that our recommendations for ensuring due consideration for the needs of the British manufacturer, i.e. the allocation of a specific part of the machine-building capacity for meeting his urgent needs, is the best means of resolving this conflict of interests, as it is of that which arises in connection with the sale of new machinery.

PART III. General Problems

CHAPTER XII. DISTRIBUTION

WITH the exception of the Lace Furnishings section, the lace industry is predominantly an export industry. There is, however, normally a substantial consumption of nearly all types of lace product in the home market, and it is possible to make a rough division of the problems of distribution, which need to be considered, into those of general application and those peculiar to overseas trading.

I. GENERAL PROBLEMS OF DISTRIBUTION

The lace product, when it has been dyed, dressed and finished, travels to the final consumer along a great many channels. The complexity of the distributive structure has already been described in the previous chapters. It should also be noted that the final consumer may receive the lace product in the form in which it left the finisher (or machine-holder), or as part of a made-up article, in which the lace may form the greater part, or merely a minor trimming. There is thus not one market for lace products, or even one market for the products of each section of the industry, but a series of markets for each section, and each of these markets has special problems of its own.

Our task in this context is to attempt to assess how far the distributors of lace perform their functions efficiently, and to recommend, if necessary, any improvements which would benefit producer, distributor or consumer, or all three. The task is not easy: we quickly found that there is hardly a single general statement of fact about lace distribution to which an exception cannot be found, while opinions expressed both about what has happened and about what ought to happen have been highly conflicting. For instance, while the majority of persons giving evidence were of the opinion that a reduction in manufacturing costs, selling costs and tariffs, leading to a fall in the price to the consumer would be beneficial to the lace trade, several witnesses with wide experience were of the contrary opinion. As one of them put it, speaking of plain dress net: 'I believe I am right in thinking that the comparatively high price of nets in the U.S.A. is an attractive selling point to the store, and it is that feature which requires to be taken into consideration'. In view of this variety of opinion we have limited ourselves to those problems which a substantial body of persons consider to be most urgent.

(*a*) *The Organization of Distribution*

Is there any one method of distribution which is superior to the others? There is no simple answer to this question.

During the years between 1918 and 1939 there was an increasing tendency for the finishers and, in the Lace Furnishings section, the machine-holders themselves, to perform some of the stockholding functions hitherto generally performed by the wholesaler, and to by-pass him to some extent, in the case of Leavers products by selling direct to the makers-up, and in that of lace furnishings by sales direct to retailers. In carrying out these functions the machine-holders found themselves obliged to handle a wider range of goods than they

could manufacture on their own machines, and like the finishers, to deal in the products of a number of machine-holders and even in products made outside the lace industry altogether. The reasons for this tendency to by-pass the wholesaler appear to have been twofold. Firstly, the weak sellers' market induced the machine-holders and finishers to seek any possible means to keep their machines and organizations going. Secondly, there appears to have been a tendency—and it is most significant that the Wholesale Textile Association, in their evidence to us and in their Report* take the same view—for the wholesalers to perform their essential functions less completely. Thus in many cases they failed to place orders with manufacturers large enough and early enough to ensure continuity of production, and tended instead to become in certain cases mere channels for the passing on of small orders from the retailers to the machine-holders and finishers. Some persons in the lace industry have made the point that the wholesalers in the inter-war period showed an undue preference for foreign laces and for other textile products. At the same time, others criticize the wholesalers for giving more attention in their purchases to price than to good quality and design. We believe that there is some substance in these criticisms, to which we return below, but we would point out that to some extent they cancel one another out.

(*b*) *The Cost of Distribution*

Although, as was mentioned above, some members of the industry believe that price is of little importance in selling certain lace products of an exclusive kind, there is little doubt that a substantial part of the output of the industry is sold to consumers for whom price is an important consideration. While we were unable to obtain any detailed information about distribution costs, there seems to be general agreement that typical pre-war margins were about 15 per cent on returns for lace furnishings and 20 per cent on returns for Leavers for wholesalers, and 25 to 33⅓ per cent on returns for lace furnishings and 30 to 40 per cent on returns for Leavers for retailers. Several instances of a much higher spread between price in the shop and price ex-factory or ex-finisher were quoted in evidence. Since many lace products are peculiarly susceptible to the vagaries of fashion, margins for these products higher than the average for textiles are to be expected. At present almost the whole of the home trade is in utility curtain net and table covers, for which the controlled margins are 15 per cent on returns for wholesalers and 25 per cent on returns for retailers. Such other products as are to be sold on the home market come under the General Apparel and Textiles (Wholesalers' and Retailers' Maximum Prices and Charges) Order 1945, at 17½ per cent on returns for wholesalers and 30 per cent† on returns for retailers. A special inquiry into the distributive costs of lace products would have been extremely difficult, and it is unlikely that very fruitful conclusions would have emerged, for there are relatively few distributors for whom lace forms a significant part of their business. Accordingly, reductions in the costs of distribution of lace are only likely to come as part of a reduction in distribution costs all round. At the same time we feel that an inquiry into distribution in general is long overdue. A state of affairs in which manufacturers and consumers believe distributive

* Textile Distribution in the Post-War World: the Third and Final Report issued by the Post-War Reconstruction Committee of the Wholesale Textile Association.

† Since reduced to 27½ per cent.

costs to be too high, and yet are unable to confirm or to refute their opinion, is unsatisfactory, and we would urge the Government to take steps to inquire into the whole question of distribution costs at the earliest opportunity.

2. DESIGN

The importance of design in the lace industry is such that we have devoted a separate chapter of this Report to it. Here there is need to mention only one or two points which emerged in the course of our investigations. First there is the question of contact between designer and buyer. Complaints were made that the channels for the transmission from buyer to designer of information about what the public wants, and from designer to buyer of ideas about what the public could be offered, were both tortuous and clogged. In some cases this appears to be the fault of the machine-holder or finisher, who gives inadequate recognition to the importance of the designer, and thus does not always enable the buyer to establish personal contact with the designer: in other cases it seems that the wholesaler is at fault, in employing as a buyer a man who is concerned with buying a wide variety of goods, and has not the specialized knowledge or taste to make him a good buyer of lace. We consider that the solution to this problem lies partly with the manufacturers and wholesalers themselves, and also with our proposals for the establishment of a Design and Fashion Centre, and the undertaking of market research (Recommendations 52 and 26).

A second problem which caused increasing embarrassment to the machine-holder in the inter-war period was the multiplicity of designs. Here there is a definite conflict between the wholesaler, finisher or exporter who wishes to carry the widest possible range of designs to meet the demands of his customers and the machine-holder who obviously prefers to have large orders for a limited range of designs for fairly lengthy periods. The problem is to steer between two extremes. Before the recent war the buyer was in the stronger position and, to meet his requirements, some machine-holders were manufacturing several hundred designs in a single year—involving on occasion more than one change of designs on the machines every day. The position is reversed today, and the buyer is anxious to acquire whatever the machine-holder can produce. The problem is thus closely bound up with the state of demand. If those steps are taken which we recommend to expand and to stabilize demand, a great part of the difficulty may be overcome. Part of the fault undoubtedly lies with machine-holders themselves, who, in their anxiety to keep machines running, have been prepared to accept all kinds of small orders at prices which do not fully cover the extra costs incurred by frequent changes. We were unable in the time available to make a detailed study of costing methods, but we received ample evidence that such methods are often inadequate and in some cases primitive. The concentration companies in both the Leavers and Lace Furnishings sections have done a good deal to encourage adequate costing among the firms for which they held responsibility. There is, however, still much to be done, and we recommend that the Associations concerned should at once undertake an investigation into methods of costing, the results of which should be made available to the machine-holders before the period of excess demand is over, so that another fatal slide into excessive designing and the resulting loss in output may be avoided.

Closely associated with this is the problem of continuous debasement of design and quality. A machine-holder or finisher may put on the market a new lace product of good quality and design at a certain price. The gradual adaptation of this design by its producer to lower-priced goods and slacker quality is to be expected if the product proves popular, a process that may take some two years to complete. Provided that the design is not unsuitable for reproduction in slacker qualities, there is nothing to complain of in this process, characteristic of the product of a fashion industry. On the other hand the industry has suffered considerably from time to time by the pirating of such ideas and the swamping of the market with cheap and debased reproductions.*

Two distinct questions are at issue. One is the copying of designs, which is discussed in Chapter XV. The second is the regular debasement of the quality of products, which in the longer run, even if practised only by a minority of the trade, seriously endangers the reputation and goodwill of the trade as a whole. A strong opinion has been expressed that standard or minimum qualities should be enforced, below which producers should not be allowed to manufacture. As one twisthand in the trade put it: 'It is a scandal that poor people have to buy some of the stuff we turn out'. This may not, however, solve the problem. For the scandal lies as much with the poverty of the consumers in question, as in the fact that the only lace products which can be brought within their range must, almost inevitably, be of a very low grade. The point is of some quantitative significance, since it applies particularly to considerable parts of the colonial and native markets.

We have given much thought to this problem, and have come to the conclusion that to establish minimum standards would probably deprive this class of consumer of lace, and the lace trade of a significant volume of production. We are, however, concerned that every effort should be made to prevent deception of the consumer, and we have considered various methods by which she should be given greater knowledge of what it is she is in fact buying. The problem involved in protecting the consumer varies with the various types of products. In the case of plain net it would seem that it is quite practicable to work out a system of standard specifications, based on yarn counts and the number of holes per inch. The establishment of a Certification Trade Mark applied, under the control of a suitable certifying organization, to net conforming to certain standard specifications would, if accompanied by suitable publicity, be at the same time a protection to the consumer seeking high-grade goods and a means of impressing on foreign markets the high quality of British net products which is generally admitted in well-informed quarters. A similar scheme for a range of products already exists for utility curtains. Clearly it is desirable that so long as the acute shortage of window furnishings in the home market persists the utility specifications, which are designed to economize in materials and at the same time are subject to price control, should continue, though they may require some adaptation.

Another way of protecting the consumer against a form of deception not uncommon in textile products, is to make compulsory the marking of all lace products whose 'filling' (i.e. dressing which disappears with washing) exceeds a stated percentage of their weight.

* In this connection we hope that the pre-war practice of charging fixed retail prices, e.g. 1s. 11d., 2s. 11d., 3s. 11d., and so on, abandoned during the war, will not return. Lace is often a marginal item in garments and articles sold at such fixed prices, and very often the pressure to debase a quality to bring it down to meet a fixed price was very great.

For those products of the industry in which complexity of design makes any general specification impossible, we suggest that firms should consider whether branding, which is already practised by some firms, would be advantageous.

A more difficult, but if it could be achieved, a more complete method of protecting the purchasers of all lace products, would be the working out and application of a 'user' or 'durability' test and the employment of a Certification Trade Mark to indicate that goods conform to it. We recommend that the Lace Federation Research Council be asked to investigate, in consultation with the British Standards Institution, the possibility of devising such a test.

3. EXPORTS

The lace trade can make a notable contribution to the maintenance and expansion of British exports. Despite the serious difficulties encountered, in different degrees, by the various sections of the industry before the war, British lace products were still well established in world markets. In 1938 the United Kingdom was the largest exporter of lace products in the world—providing nearly one-third of the total.* The Plain Net section is predominantly an export industry, less than 20 per cent of its production being normally retained for home consumption. The Leavers section also has a strong tradition of exporting and probably exported as much as 70 to 80 per cent of its output before the war. The Lace Furnishings section has been hitherto predominantly concerned with the home trade, though it has always had considerable export interests; for example, in the five years before the war over a quarter of its output was exported. At present, under the system of raw material allocations, Leavers, plain net and embroidery products are 100 per cent export, except for hair-nets, 50 per cent of which may be sold on the home market, and utility curtain net; while in the period November to March 1946–47 some 30 per cent of lace furnishings output is being reserved for utility production of curtains and table covers for the home market.

A rough idea of the orders of magnitude involved in exports can be obtained from Table 66. We say 'orders of magnitude' advisedly since there is evidence that the figure for total exports is too low, and that the classification of products is misleading. We have been able to confirm this in the special case of lace furnishings where we have an independent check, and in Table 66 it is possible that item (*g*) contains a substantial proportion of lace furnishing products of rayon mixture.

Fifty-five per cent of total exports went to Empire markets just before the war. This figure is the result, not of the absolute growth of sales in Empire countries, but of a decline in sales in other foreign markets. In particular sales to the U.S.A. fell off substantially in the inter-war period. In the first place the U.S.A. developed substantial Leavers and lace furnishings industries in the decades preceding the war of 1914–18, and gave very substantial protection to these industries, amounting to 60 or 90 per cent *ad valorem* according to the type and gauge of product. Secondly, the U.S.A. imposed a differential tariff of 60 per cent on fine gauge lace and of 90 per cent on coarser gauge lace. The French Leavers industry, with its higher proportion of finer gauge machines, was at an advantage compared with the British industry with its higher proportion of coarser gauges. The British industry's hold on the Empire markets was, however, certainly strengthened by the preferential tariff since 1932.

* See Table 1, p. 21.

TABLE 66

EXPORTS OF LACE PRODUCTS OF THE UNITED KINGDOM
(ANNUAL AVERAGE 1935–38)

	Empire Countries £000	Foreign Countries £000	Total £000
(*a*) Lace curtains, in the piece or not, of cotton	151	77	228
(*b*) Lace net of cotton	296	414	711
(*c*) Lace, other sorts, of cotton	190	143	333
(*d*) Lace and lace net, wholly of silk	9	46	55
(*e*) Lace and lace net of silk, mixed with other materials (including artificial silk)	51	22	73
(*f*) Lace and lace net wholly of artificial silk (including staple fibre and waste)	28	49	78
(*g*) Lace and lace net of artificial silk, mixed with other materials (excluding silk)	252	35	288
(*h*) Lace and lace net (except embroidery) and materials resembling lace and lace net not elsewhere specified	1	1	2
Total	980	788	1,768

Imports and Re-exports

Before 1914–18 and in the years immediately following, there was a substantial import of lace products into the United Kingdom, mainly from France. A considerable part was re-exported.

TABLE 67

UNITED KINGDOM IMPORTS AND RE-EXPORTS OF LACE AND NET AND ARTICLES THEREOF (EXCEPT EMBROIDERY) IN SELECTED YEARS

	Imports £000	*Re-exports* £000
1913	2,732	1,426
1919	986	820
1921	1,660	1,417
1923	2,017	1,319
1925	1,366	805
Finance Act 1925		
1926	557	95
1927	583	147
1929	668	105
1931	438	36
1933	163	10

Table 67 shows clearly the effects of the safeguarding duty provided for in the 1925 Finance Act which gave a protection of 33⅓ per cent, in reducing the value of imports into the United Kingdom. After 1932* the import duty was 30 per cent, and in the five years preceding the war retained imports averaged only £185,000 a year. The considerable entrepôt trade which existed prior to 1925 disappeared almost entirely after the safeguarding duty was imposed, although the figures above do not include laces imported under bond for re-shipment.

Export Marketing

The complex arrangements for the marketing abroad of British lace net and lace furnishings products have already been described for each section. The bulk of products are exported in the finished state, but some exports of Leavers lace and plain net in the brown existed before the war, mainly as an attempt to get past the high *ad valorem* tariffs in U.S.A.

The larger finishers, and many machine-holders in the Lace Furnishings and a few in the Plain Net sections have their own agents and even subsidiary merchanting companies, in the principal foreign markets. The smaller concerns sell either to buying agencies in the United Kingdom or to confirming houses or wholesalers. In addition a substantial export goes through exporting houses, directly as lace products or indirectly in made-up articles. To a certain extent the larger finishers concentrate on their own particular export markets, so that the number and variety of exporting methods does not necessarily imply a dissipation of selling energies in excessive competition between several British firms for the same foreign demand. Nevertheless we feel that there is considerable room for a tightening up and improvement of selling methods, and we make proposals on pages 109–11 designed to achieve this end.

Tariffs

Whatever the selling organizations, the volume of sales actually achieved will inevitably be affected by tariff levels, both abroad and in the United Kingdom itself. The British industry is competing with domestic industries in a number of foreign countries, notably U.S.A., and with other foreign industries, particularly the French, in nearly all foreign markets. And there is always the possibility of foreign competition in the home market, once the period of 100 per cent export allocations is over and the complete embargo on imports at present in operation is removed.

A fair picture of the structure of tariffs in lace articles, imposed by the many countries to which British lace-makers sell, cannot be given in a paragraph. A short list prepared for the principal countries runs into a hundred pages of typescript and, as it was put in a memorandum submitted to us, 'Each country's tariff system seems to have grown without any collaboration with other countries,

* The original duty was imposed for a period of five years. When it lapsed in 1930 there was no duty on lace and embroidery other than general duties of varying amounts on textiles containing silk and rayon. In 1932 lace came under a general duty of 10 per cent imposed on all textiles on 1 March 1932 under the Import Duties Act. On 26 April this was raised to 20 per cent, and on 27 June a specific duty on lace and embroidery of 30 per cent came into force.

and the whole position is completely chaotic'. In most cases, though not all, tariffs are *ad valorem*. This is satisfactory; where the tariff is levied on the weight of these articles, the cheaper, coarser gauge products are taxed disproportionately heavily. The range of *ad valorem* tariffs at present runs from zero for certain imports into Canada through the whole range of numbers to 90 per cent in the case of a large class of articles entering the United States. Tariffs of the order of 20 to 45 per cent *ad valorem* are frequently encountered: the preferential tariffs in Empire countries run in general between one-third and two-thirds of the full rate.

Apart from the perennial difficulty of attempting to sell through such a complex system of duties, we consider that the lace trade has been handicapped particularly in two respects.

(1) 'Lace' is generally considered a luxury article. In fact, only certain Leavers lace products can be fairly classed as luxuries. Mosquito and sandfly netting, curtains, hair-nets, etc., are in no sense luxuries: yet in many cases they are levied for duty as such, a burden which affects their sales both by making them too costly for some classes of consumers and by giving a differential advantage to other textiles in competition with them. The New Zealand tariff item 181 (1): *textile piece goods* gives a British preferential rate of three per cent *ad valorem*. Item 182, which includes curtain nets, gives a British preferential rate of 20 per cent *ad valorem*. In addition there is a sales tax of 20 per cent for both items which accentuates the differentiation.

(2) Rayon is still commonly called artificial silk, and again, in cases where specific duties are applied, the product is treated as though it were a luxury similar to a real silk product; e.g. in the Anglo-Egyptian Sudan *cotton laces, etc.*, pay a duty of 10 per cent, while *laces of artificial silk mixed or not with cotton* pay 50 per cent. This is, of course, a problem common to all textile exporting industries. The practice has, however, a peculiarly unfortunate effect in the lace industry where small quantities of rayon are often used in combination with other fibres. In the Leavers section, for instance, a pattern may often be outlined in rayon thread in order to give it emphasis.

We should have been glad to put forward detailed proposals for tariff reductions which would be of assistance to the Government in the present and future negotiations for the reduction of world trading barriers. But the necessary data cannot at present be obtained. Moreover, the economic situation in various countries is at present in such an uncertain state that calculations based on relative costs and prices today would be out of date within a few months or even weeks. For example, when the Delegation from the Working Party visited France in October, we ascertained that labour costs per unit of output were roughly the same in the two countries at the current rate of exchange. But, from a purely competitive point of view this position may change favourably to Britain if French wage rates continue to rise faster than British, and unfavourably if the franc is further depreciated. This extreme uncertainty will be encountered in almost every instance in which an attempt is made to calculate specific relative costs. Accordingly we limit ourselves to a few comments of a general nature.

(1) Everything is to be gained by the simplification and unification of tariff systems.

(2) It is desirable that all lace tariffs should be brought into line with those in the majority of countries by putting them on an *ad valorem* basis.

(3) It is desirable for lace products to be classified on the lines proposed in Appendix III: (*a*) according to the machine of origin, and (*b*) according to the use to which they will be put (i.e. whether they are considered luxury articles or necessities). In this way duties payable would be imposed on a rational basis.

(4) It might well be that, at the moment and in the next year or so, a complete abolition of all tariffs on lace products, including our own, would make little difference to the volume and direction of world lace exports, since the shortage of yarn is the over-riding factor both in this country and France. This would, of course, not be so once yarn supplies become more plentiful, and the pent-up demand begins to be satisfied, but this is not likely to happen for some years. We consider, therefore, that the proper way to begin the process of tariff reduction is to start with the highest. We see no reason to reduce the British tariff so long as it remains substantially lower than those ruling in certain other countries. On the other hand, we consider that, once other tariffs have been brought down to the British level, further all-round reductions would be to the benefit of all countries concerned.

The point has been made on one or two occasions in evidence, that the British consuls and commercial attachés in overseas countries have not, in the past, been of much service to the trade. This is a common criticism, and there is little doubt that there is much substance in it, and this fact has been recognized by the Government. We wish, however, to counter the somewhat parochial view which appears to prevail that the Government is in a position to provide by some miracle, consuls and commercial attachés who are experts in the problems of all industries. If it is the Government's responsibility to appoint men of the right quality and general experience, it is the responsibility of the lace industry to see that these men are informed of the problems in which it is interested and, if necessary, to see that the British representatives overseas are given all the necessary specialist advice which only the lace industry itself can provide.

4. THE MAINTENANCE OF DEMAND

We believe that world demand for lace products is likely to exceed the pre-war level, and that, provided supply difficulties are overcome, the British industry should be able to obtain a good share of this demand. But something more is needed than merely hoping to take part in a general revival, and while we believe that the existing distribution system is adequate for meeting any given demand, a development of market research and co-operative publicity is required if that demand is to be stabilized and further developed. At present there is little or no systematic market research. Naturally the agent of the British machine-holder, finisher or shipper is in a sense a research worker in this field, but, inevitably, his experience is often incomplete. Moreover, there is a certain waste since his experience is not shared with other agents and is thus not available to the industry as a whole. The advantages of common market research, for an industry of small firms, are obvious. The pooling of expenditure and the sharing of knowledge obtained will enable more to be undertaken at the same cost. The same might also be said of publicity and of central selling. There are, however, certain qualifications to this which are discussed below.

Three stages can be distinguished in the process of building up and maintaining a market abroad.

(1) *Market Research*

(*a*) If the possibilities of a particular foreign country as a potential market for lace products are to be fully assessed, there is a great deal of fundamental information which should be at the disposal of the selling organizations such as the size of the population, income levels, the distribution of incomes, and the quantities and types of housing. There is further a great deal of information about the structure of the foreign market itself, such as the methods of distribution and the tariffs and fiscal system. Much of this fundamental research is being done by the Board of Trade, by the Foreign Office, and by organizations such as the British Export Trade Research Organization. We are not therefore suggesting that the lace industry should do all this work itself. What is needed is a Research Officer whose duties would include finding out what other agencies are doing and in ensuring that their results flow regularly to the British exporters of lace, and who would undertake special inquiries himself, or would be responsible for commissioning other agencies to undertake them. As indicated in Recommendation 59, we consider that such an officer might properly be attached to the Research Council.

(*b*) Next there is research into matters concerning consumers' preference. The field of inquiry is at this stage focused on the various lace products themselves. What lace products are already being sold, in what quantities? Are there other products which might find a ready outlet in this market? This work might well be carried out on behalf of the whole trade, or section of the trade, either by specialist officials or by machine-holders and finishers with suitable qualifications, who would be prepared from time to time to visit one or more markets to investigate their potentialities.

(2) *Publicity*

On the basis of the reports of the research organization, it should be possible to decide whether or not particular attention should be paid by the trade (or section of it) as a whole to a particular market. A collective publicity campaign might then be financed by the trade as a whole. Both the Leavers and the Lace Furnishings section undertook such campaigns before the war, and although the time available in which to judge results was short and the scale at least in the case of the Leavers section was relatively small, there seems to be a consensus of opinion in favour of further experiments on a larger scale.

(3) *A Co-operative Sales Organization*

The fullest advantage of market research and publicity campaigns cannot be taken unless there is an adequate follow-on of lace products ready for sale, and it might seem that a common sales organization should follow the two preceding stages. But while this may be logical it appears to us to be impracticable. Most sections of the trade are highly competitive. Moreover, the extreme variety of products offered would make the handling of all of them by a single agency a very difficult task. During the war British Lace Furnishings Ltd. was formed to

handle all contracts on behalf of its members (nearly all the curtain machine-holders). So long as the bulk of the contracts were for Supply Departments, for such standardized products as mosquito and sandfly netting, the system worked admirably. But more recently it has become increasingly difficult to handle the variety of orders which are possible now that exports to foreign countries have replaced war contracts. No doubt this experience is partly due to carrying a volume and variety of business through an organization which is too small, being designed for a much more limited purpose. But we remain doubtful whether such an organization would in any case prove a success, and we are also aware that it would receive little support in any section of the trade. We are of the opinion, however, that in particular cases advantage may be taken of the wartime concentration experience, and a specific proposal is made on page 112.

The Finance of Market Research

In the light of the above we had to decide two questions:

> Should these services be undertaken for the industry as a whole, or section by section?
>
> To what extent, if any, should they be financed out of a compulsory levy, or direct grant?

To take the latter question first. We are of the opinion that there is a strong case for the compulsory finance of economic and market research and of publicity in overseas markets, on the grounds that the national interest requires the development and maintenance of a high level of British exports, and that all firms in the industry stand to gain by the stimulus thus given to overseas trade.

The problem then arises whether this research and publicity should be undertaken for all sections of the industry, or section by section. For the more fundamental economic research the balance of advantage clearly lies with the former. Many of the problems for investigation in this field are common to all sections, and the amount of specialization by branches of the trade will not be beyond the capacity of a single compact organization. Accordingly we recommend that a new Economics Section of the Research Council be set up, and financed out of the levy on all firms in all sections, which is outlined below (pp. 138–9).

For publicity and for that branch of the research which was distinguished under (*b*) above, which, for convenience we may call 'specialized' market research, the balance of advantage lies the other way. The overseas markets for dress laces and window furnishings have too little in common to justify a common organization. Indeed, the case for this 'specialized' market research and publicity seems to have been most strongly made out for the Lace Furnishings section, though it seems likely that they would also prove useful to a less marked degree in other sections. We recommend accordingly that funds be allocated for this purpose from the levy raised on the Lace Furnishings firms and that similar steps be considered in other sections. For the Fancy Lace sections it seems likely, however, that a higher proportion of their available funds can best be spent on the establishment of a Design and Fashion Centre in London. With this Centre the sections which produce lace furnishings would also seem well-advised to associate themselves, though it may play a smaller part in their plans. The details of this Centre are discussed in Chapter XV.

Continuity of Production

In considering the problem of continuity of production and full and steady use of the available labour, we have been impressed by the remarkable achievements of the concentration companies during the war. Output per twisthand during concentration has been at an extraordinarily high weekly level, and continuous employment has meant a much higher annual level of output. If this continuous annual output can be maintained it will help to overcome the labour shortage emphasized throughout this Report. We cannot expect or desire that wartime standardization of products will continue in this industry, but experience has shown the increase in output which may be expected if reasonable production runs can be maintained.

Our aim in recommending a variety of measures leading to trade expansion, e.g. market research, the establishment of a Design and Fashion Centre, organized publicity, etc., is to reduce as far as possible both the fluctuations of demand to which a fashion goods industry is peculiarly susceptible, and those which arise from seasonal causes.

We must admit however that it seems unlikely that completely smooth running of all firms will ever be achieved, though if our suggestions with regard to multiplicity of design, and the policy of wholesalers are carried out, a greater continuity may be achieved. We also put forward tentative proposals of a more experimental nature as worthy of serious consideration.

(*a*) For instance, in the Lace Furnishings section there is a certain range of standardized products, i.e. various forms of netting and screening, for which there may be a continuous demand. Should such a demand materialize it might well seem desirable that all the firms in the section should combine to form a co-operative sales organization, which would have the sole selling rights to these products. This co-operative organization would accept contracts for the industry as a whole, and would hold stocks of the goods in question. It would then place contracts with individual machine-holders for goods to be delivered at any time, say, within a year. In this way the machine-holder would hold these contracts as a reserve against a falling off in production of the remainder of their normal range of output. Another way would be for the co-operative organization to announce prices at which it would be prepared to take any quantity of the standard products. As a rule these prices would be less profitable to the producers than their ordinary business, but they would be able to fall back on these 'less eligible' lines if necessary. By the appropriate adjustments of prices the co-operative organization would be able to keep their own stocks running between reasonable upper and lower limits. Net profits of the co-operative organization could be redistributed annually in proportion to the various firms' output of the standard articles. In giving these examples we do not wish to lay down any particular system to be followed. We wish only to illustrate in principle how such a scheme could work, and we strongly recommend to all sections to which such conditions may apply the advisability of considering such a co-operative arrangement. This matter might well be considered when the concentration schemes are being wound up.

(*b*) Certain sections of the industry from time to time fulfil orders for various public authorities. These orders might well form a valuable cushion against severe fluctuations. This can only be the case, however, if the orders are placed

in accordance with a long-term plan and not merely as part of an annual budgetary scheme. Co-ordination between public authorities at home and overseas in the placing of orders would ensure the most effective use of this block of public purchases and would be consistent with the Government's policy of full employment.

(*c*) The Leavers section have under consideration a scheme by which machines thrown temporarily out of operation will be maintained at the expense of the section as a whole, as a means of checking the tendency to the unproductive working of machines in periods of trade recession. In the long history of fluctuations in the lace industry, somewhat similar schemes have been tried out both in this country and in France. Though they have proved insufficient to check an acute crisis they have had some success, when the situation was less serious, if adopted in good time.

(*d*) In all questions of continuity of production, the co-operation of finishers, wholesalers and shippers is of the utmost importance, and we cannot overstress its significance and the responsibility which all sides of the industry must share in ensuring the prosperity and steady progress of the industry.

Price fixing

As a rule, the forces of competition in the various sections of the lace industry are fairly strong, but there are instances of minimum price fixing, e.g. in the Dressing section. The Leavers section have recently approved in general terms proposals for minimum price fixing. It is pointed out with regard to the former that price fixing has not destroyed competition which still remains in the form of one firm offering better services than the next. There is no evidence that this 'service' competition has gone to any extravagant lengths. Much can be adduced for and against such arrangements, the justification for which depends on the circumstances and the use which is made of them. We have not felt in a position to evaluate their results either in general or particular. As, however, the public interest is directly involved in these arrangements, we recommend that they should be investigated as part of any wider inquiry into price fixing practices throughout industry which may be set on foot.

CHAPTER XIII. FACTORY PREMISES AND WELFARE

THE problem of welfare, i.e. that of ensuring working conditions that contribute to the well-being of the worker and thus assist indirectly both in the recruitment of labour and in its high productivity, is one demanding a satisfactory solution if the industry is to build up an adequate labour force. Welfare, the basic characteristic of which is that it deals with workers as human beings and not as mechanical components to the success of an enterprise, has assumed a position of vital importance in every industry. As a result of education in schools, experiences in many homes and the impact upon industrial conditions of the erection for war purposes of light, commodious and well-ventilated factories equipped with every amenity, workers in all industries are demanding more satisfactory premises to work in than were customary in the past. The lace industry, like other British textile industries, is handicapped in the provision of the amenities expected as a result of this revolution in factory conditions, by premises and industrial traditions which for the most part ante-date this revolution.

The problem of welfare must be considered in relation to the organization of the industry itself, as well as the trend of contemporary practice. The problems of the large firms in the Plain Net section can, for instance, be compared with those obtaining in the larger units in other industries, where it is necessary to provide those contacts and services designed to prevent the worker from feeling that he is merely a cog in a vast impersonal machine. Those of the small-medium firms characteristic of the other sections are rather different, though there are many amenities they are able to offer quite as useful as those that are possible in the larger unit. Even in the very small firm useful measures can be taken, though for them the problem presents itself in the most difficult form and may only prove soluble on a co-operative basis. Both among the large and the small-medium firms we have seen establishments where problems of welfare have been tackled with conspicuous success and a number of others where thought and money is being expended in full realization of the importance of the subject. But we have seen a vast difference between the finest and the poorest factories, and although much has been done it cannot be claimed that over the industry as a whole it has been anything like enough. The need for a full-scale attack on the problem is the greater because of the prejudice which exists against employment in the industry and which, though partly due to irregularity of employment in the past, is to a considerable extent attributable to unsatisfactory conditions.

Though a summary of the position gives no guidance to the practice of individual firms, it can be said that the general situation is less satisfactory in Nottingham and the surrounding districts than either in the south-west of England or in Scotland, and that the problem attains its most serious form among the smaller machine-holding firms. Considering for the present only the three main machine-holding sections, one can single out the following as the most serious disadvantages of the industry from the welfare point of view, some of which are encountered to some extent in all firms, a good many of which can be found in some firms, and all of which are found in the less satisfactory firms. All machine-holding firms suffer from the following:

(1) *The noise of the machines.* The lace machines like much other textile machinery are noisy; and even those processes which are not noisy themselves have often to be carried out in such close proximity to the machines that they share the disadvantages and make it impossible in many cases to relieve the monotony of the processes by such measures as the relaying of the 'Music While You Work' programme. Though the disadvantages of noise are widely recognized, little attention has so far been paid to its reduction in this industry. Research on this subject would seem to be overdue.

(2) *The use of black lead (graphite) as a lubricant.* Black lead, the only lubricant at present generally accepted as suitable for lace machines, is applied in the form of powder and impregnates the premises and blackens the clothes and persons of the workers, giving the machine-holding sections the character of a 'dirty trade'. The industry has long been conscious of the unfortunate consequences of this, and many substitutes have been investigated by individual firms, but with very moderate success. The Research Council are engaged in an investigation of the problem, and if, and as soon as a satisfactory substitute has been found, it is essential that its use be immediately and universally adopted.

In the firms where conditions are unsatisfactory, the following are widely found:

(1) The plant is often so closely spaced in the factory premises as to make working conditions inconvenient and unpleasant. (It should be noted, however, that the accident rate is low. Lace is not a dangerous nor an unhealthy industry.)

(2) As a result of black lead, of lint left to accumulate on the floors, and the disorderly storage of articles such as jacquard cards without cover, the premises are frequently very dirty and give an impression of neglect and indifference to appearances.

(3) The artificial lighting is not always up to date, and the natural lighting often obscured by dirt on the windows of ribbed glass, the use of which is traditional in the industry.

(4) The approach to the factories in 'storied' or tenement buildings is bad, being up steep and dingy common staircases.

(5) There are frequently no lockers or adequate cloakroom accommodation, and the workers' out-door clothes hang on the dirty walls.

(6) The washing and lavatory arrangements are often, owing to wartime interruptions in supplies and installation, only now being brought into conformity with the provisions of the 1937 Factory Act, and even where they are not inadequate they are often dark and unattractive. The provision of hot water is still rare.

(7) There are often no rest-rooms, mess-rooms or canteens.

(8) The provision for dealing with accidents is not always adequate.

That some of these unsatisfactory features can be remedied without undue difficulty is shown by the way in which a number of firms, which enjoy no special advantages, are tackling them. It would, moreover, be unfair not to point out that the war interrupted a movement towards improved conditions. There is widespread interest, for instance, in the question of lighting, and many firms have installed various forms of fluorescent lighting to supplement daylight and the adjustable lamps required by the twisthand. Improved types of adjustable lamp have also been seen, as also special illumination for the spool-boards of Curtain machines. In matters of cleanliness and the improvement of appearance of factories, the pleasant conditions of certain factories go far to discount the contention that nothing worth while can be done until black lead can be eliminated. Thorough cleaning and the use of industrial vacuum cleaners can effect a great improvement. Similarly, a number of firms are seeking to re-arrange their auxiliary plant and to reorganize their storage arrangements so as to reduce the congestion of their premises. The installation of hot water, mess-rooms and, where circumstances justify it, canteens, has also clearly become more common in recent years.

The major difficulties which face most of the firms whose conditions are unsatisfactory are the following:

(1) *The unattractive character of the typical nineteenth-century factory premises in which a high proportion of the industry is housed.* There is no doubt that entrants to industry are repelled by the grim and bleak

appearance of these premises, even when they are otherwise not unsatisfactory, while the absence of modern ventilation, and (where processes are carried out on different floors) of lifts are real disadvantages. The seriousness of inconveniences of this kind and the possibility of removing them varies with the circumstances. The appearance of such premises can, however, be greatly improved by skilful treatment, in particular by the use of light paint on walls and possibly on machines on the lines recommended by the British Colour Council.

(2) *The fundamental unsuitability of some of the premises and the serious overcrowding of plant in others.* This last is the gravest problem in the field of welfare which faces the industry. It affects a considerable number of firms in all the main sections. It can be considered under three heads:

(*a*) The factory of modern shed type which is well suited for its purpose, but where, in accordance with the general practice of the past, machines are much more closely spaced than would now be considered desirable and the auxiliary processes and stores have been fitted in wherever space could be found. Such factories, some of which are rented but some of which are owner-occupied, may or may not have land for extension.

(*b*) The factory premises or 'standings' rented in the more modern 'storied' factories (in the Leavers section known as 'wide tenements'). Here, too, though the premises may be in themselves quite suitable for the processes carried out in them, there is often the same overcrowding, while convenient extension of premises nearly always presents serious difficulties.

(*c*) The factory premises or 'standings', usually occupied by small firms, rented in the older 'storied' factory buildings (in the Leavers section these are known as 'narrow tenements'). These premises are entirely unsuited for housing the machines now in use, which are much larger than those for which the factories were built. Not only are these machines crowded as closely together as possible in many cases, but they are too wide to allow easy passage round the end of them; indeed, in the case of Leavers machines, the spring at one end of the machine has to be allowed to protrude under a wooden hutch, or 'window box', through the window, thereby obscuring the light. In the case of Curtain machines they are so high that they barely clear the roof, their superstructure darkening the room. The floor vibrates with the weight and strength of the machines when they are in operation, and the Production Sub-Committee of the Working Party have visited premises where it was only with difficulty that they could find standing room.

We believe that, if the industry is to provide the working conditions which will enable it to recruit an adequate labour force, it must aim at achieving, as a first necessity, in as short a time as possible, the following as minimum spacing between machines:

Curtain machines. A minimum of four feet at the base of machines facing one another; three feet between spool-boards at the back, and two feet six inches clear floor space at the ends.

Leavers and plain net machines. A minimum of three feet at the base of the machines back and front, and two feet six inches clear floor space at the ends. A practical difficulty arises here in that the position of the supporting columns in a large proportion of existing Leavers and plain net factories makes it impossible to allow as much as three feet between the machines. In such cases, and in cases where there are obstructions which cannot be removed without major structural alterations, we advocate a minimum standard of two feet between the nearest point of one machine and another, and two feet between the nearest point of the machine or jacquard and the wall. We would, however, emphasize that we regard this lower standard as a practical necessity at the present time in a number of factories, but that it is not wholly satisfactory. All firms building new factories, and those occupying premises where it is possible, should adopt the higher standard, and the rest should aim ultimately at moving into premises where the higher standard is practicable. We recommend that as soon as conditions permit, this minimum spacing should be made obligatory in all firms.*

Firms should also aim at concentrating the winding and warping processes in a part of the factory partitioned off for the purpose and away from the lace machines, and at improving the placing of other auxiliary processes where this is unsatisfactory. We have drawn out a plan of a model Leavers factory (p. 159) as a guide to the kind of factory layout which we think should be aimed at. Comparable plans could be made for other sections of the industry.

In the case of premises coming under categories (*a*) and (*b*) above, satisfactory spacing of machines can be achieved by one of two methods; extension of premises or reduction of the number of machines installed in the existing ones. We do not underestimate the difficulty of either solution, nor the expense and labour involved in shifting the machines for re-spacing. It may well be that in many cases firms with premises in category (*b*) may find the building of new shed premises more satisfactory from a long-term point of view. In the case of firms with premises falling into category (*c*) any solution must be even more drastic; nothing short of removal to better premises or the building of new ones can avail.

We make recommendations (Nos. 36, 37 and 38) on this difficult subject for all three classes of premises. Firms able to undertake their own building or extension of premises will presumably be eligible for loans from the Finance Corporation for Industry. It is doubtful, however, whether the allowances for taxation purposes on expenditure on new buildings under the Income Tax Act of 1945 are adequate. We consider that the initial allowance of 10 per cent and the annual allowance of two per cent on the cost of new buildings or reconstruction of parts of existing buildings are insufficient. An increase of the initial allowance to 20 per cent and of the annual allowance to three per cent, so that the cost of a new building can be written off over a period of 27 years, would appear to be desirable if the strong stimulus is to be given to modernization of factory premises which the position of the industry calls for. We welcome, however, the adjustments in the provisions on Tax Balance Allowances on the sale of pre-1945 industrial buildings contained in the Finance Act, 1946.

The obstacles in the way of this solution for small firms with little capital are formidable. If they are to be surmounted at all, there may be required both

* Recommendation 35.

assistance from the local authorities and co-operation among the firms concerned. The small firms at present occupying rented premises of an unsatisfactory kind can in most cases only be rehoused if premises are made available for them on conditions rather similar to those under which they operate at present. Some type of 'flatted'* factory with provision for common welfare facilities is called for. It seems unlikely, however, that the provision of such premises by private enterprise can be made at present at rents within the means of the prospective tenants.

There would appear to be two means of solving their problems:

(*a*) The erection by the local authorities concerned of 'flatted factories' providing communal welfare facilities to rent out to small machine-holders employing five or fewer machines, whose premises do not enable them to conform to the standards aimed at.

(*b*) Co-operation between such firms to erect such 'flatted factories' for their joint use.

The case for encouraging the small firm to overcome these deficiences in welfare conditions, and thus to continue to play a part in the industry, would seem to be fairly strong. The very small firm, frequently founded by skilled workmen, has played a big part in the growth of all sections of the industry, and in the Leavers section, where such firms are chiefly to be found today, they make up a group of 22 firms, working 9·5 per cent of the machine capacity of the section, producing 13·6 per cent of its net selling value, and comparing favourably in productivity with any other group within the section.

We believe that, however great the obstacles, the improvement of welfare conditions not only among a few enterprising firms but throughout the industry as a whole, is so vital for restoring the popularity of the industry among entrants, that it must be achieved. A factor which has discouraged some employers in the past, however, has been the indifference and even hostility of some of their workers to such improvements. In a highly traditional skilled labour force of the kind existing in the lace industry, with an undue proportion of elderly workers, such resistance is to be expected, but it is already largely a thing of the past and it is unlikely to be shared by recruits. Both sides of the industry should try to ensure that full use is made of all welfare facilities. To help in this the extension of the use of works councils or similar bodies, which have done valuable service in this and other industries, deserves consideration. There are numerous points of importance to the smooth working of a factory that can with advantage be considered by such a joint council; e.g. consultation on matters concerning the maintenance of good, healthy and safe working conditions; on matters that create nervous and psychological reactions (sometimes out of all relation to their intrinsic importance); on questions of fatigue, machine maintenance and break-downs, health, general welfare, time-keeping and absenteeism. By promoting harmonious relations they can do much to ensure the success of a producing unit.

The Smaller Sections

The problems of welfare for the Embroidery and Barmen or Braid Lace sections are less complex, because the firms composing them are of more recent

* This term means a sharing of factory premises under one roof whether the building be of shed or storied type.

foundation. Nor have they the disadvantage of using black lead as a lubricant. Though the maintenance of attractive conditions is of equal importance to them, they have, in consequence, less far to go to achieve their aim than have many firms in the older sections. In the Warp Lace section the problems more nearly resemble those obtaining in the older sections, though they too are spared the disadvantages of the use of black lead. In general, however, the production of warp lace is carried out in conjunction with that of other textiles, and the problem of welfare in this branch of their production must be considered in relation to that of their production as a whole.

The Dressing Section

The dressers are faced with the same need to encourage recruitment by the provision of the best conditions of employment possible. They are for the most part accommodated in old-fashioned premises, of unattractive appearance, but the premises are not for the most part unsuitable for the use to which they are being put, and they should be capable of modifications to meet modern requirements when they are not suitable already. If the flat-frame be superseded, the only process at present invariably involving unpleasant conditions (the temperature is unpleasantly hot and humid) will disappear. Apart from the general desiderata of welfare referred to above, good ventilation and the draining of floors in the dyeing and bleach yard are matters that call for special attention. Conditions there are often wet, steamy and unpleasant.

The Finishing Section

The finishers' work is little mechanized, and their employees, mainly women, carry out hand processes for the most part either in the factories or as outworkers in their homes. They are not faced with the complex problems of factory layout which concern the machine-holders, and conditions are in general good, though in individual cases premises are antiquated and dirty. Like other sections, the finishers need to study all means to retain and attract their workers by giving them cheerful surroundings. Paint of cheerful colours on walls, good lighting, comfortable industrial seating, pleasant rest room and cloakroom accommodation are of particular importance, while the relaying of the 'Music While You Work' programmes often helps to relieve monotony. The prejudice of women workers against factory work and in favour of employment in shops or offices, even when the pay is less good and the work more arduous, seems in general to be best combated by employers who are able to offer them clean and bright surroundings and consideration for their personal comfort.

CHAPTER XIV. RECRUITMENT AND TRAINING

IN view of the certainty of serious labour shortage in the industry in the future we have given considerable thought to the related problems of recruitment and training. We single out five questions as of particular importance here.

(1) *Attraction of recruits.* A standard of earnings comparable to that obtainable in competitive industries, reasonable expectation of continuity of employment and of advancement, and attractive conditions of work are the necessary conditions in any industry for the success of a recruitment campaign. The first of these, though obviously important, is outside our province, and, in other sections of the Report, we make suggestions to improve the industry's status with regard

to the latter two. It is necessary, however, not only that satisfactory conditions should prevail, but also that it should be known that they do, and in particular that it should be known to potential recruits and to their parents. Unless the latter are themselves in the industry they are likely to judge it in terms of the past rather than the present or future, and even those in the industry at present may not be fully aware of changes which are taking place in it. Organizations of employers and employees and individual firms all have a part to play in ensuring that progress in the industry is widely known. Co-operation with the Juvenile Employment Service, the preparation of documentary films, short talks and descriptive booklets, are among the methods to be considered, and individual firms can adopt a variety of ways of interesting the neighbourhood in their activities.* It should not be forgotten that general measures to combat the tendency to underestimate the attractiveness and importance of employment in industry will be of benefit to recruitment for the lace as for other industries.

(2) *Training of juveniles entering the industry.* The general problems of the recruitment of juveniles have been much in our minds in view of the shortage of juvenile labour inevitably resulting from the raising of the school-leaving age. It has been customary, as in other long-established industries, to train entrants wholly in the factory, and the limited technical training outside the factory which exists at present is a recent development. Recruitment into all sections of the lace industry has been primarily from juveniles. Boys, entering as strippers, threaders, etc., when they leave school, learn to handle yarn and find out whether they are suitable for, and interested in, the industry. If they are, in time they become helpers to the twisthands and usually qualify in five to seven years to take over a machine of their own. Under the Scottish system of labour deployment, the boys graduate from strippers and threaders to spoolers, and then to twisthands. In all sections of the industry instruction is received from employers, foremen, and above all from the twisthands, whom the boys assist. In too many cases this instruction is of a haphazard kind. The apprenticeship system, once in operation in the industry, seems to have practically disappeared. Girls, who begin work at the same age on the various auxiliary and finishing processes either in the factory or the home, receive their training frequently in an informal way from forewomen and fellow-workers in the factory, or from older members of the family in the home.

The specialized educational facilities available outside the factory present several points of interest. The Nottingham College of Art and Crafts had for many years provided courses for the training of designers and draughtsmen, but these fell into desuetude, and were only revived of recent years in a new and more comprehensive form. Even more recently courses for twisthands on the curtain machine were opened at the Nottingham and District Technical College. The only other preparation available outside the factory is provided by the Secondary School for the Textile Trades in Nottingham, which gives children from 13 to 15 years of age a general education with a bias towards textile training with special reference to the hosiery and lace trades. Some 65 children enter each year for a two-years' course, the majority of whom go into the hosiery industry.

The Nottingham College of Art and Crafts provides courses for designers, draughtsmen, warehousemen and others through their School of Design. These

* One plain net firm has set up a model machine, which juveniles visiting the factory can examine and on which they can make netting. This arouses considerable interest among a promising type of entrant.

courses are for full-time students (two years) and for part-time day and evening students. They are under the supervision of the Lace Productions Advisory Committee, consisting of representatives of the Education Committee of the Local Authority, the Employers' Associations and the Trade Unions. This committee advises on the syllabus and actively concerns itself with the welfare and progress of the students. A scholarship system is in operation for full-time students (the scholarships being awarded between the ages of 14 and 16). Contributions to the maintenance of the scholars are made by the appropriate trade associations and by individuals through the Federation of Lace and Embroidery Employers' Associations, and the Local Authority provides free education. The Federation assumes certain responsibilities for the scholars up to the age of 21, helping them to find suitable jobs on the completion of their courses and watching their progress. Some firms also encourage their employees to take advantage of the opportunity of the part-time courses, and the part-time day students are nearly all the employees of lace finishers. The scheme was initiated by the Leavers and Embroidery sections; the provision of training in curtain design is less developed.

We visited the college and had the opportunity of discussing problems of the training of designers and draughtsmen with the Principal and members of the staff. We formed a favourable opinion of the quality of the training provided, and understand that this opinion is widely shared, though the present scheme has not been long enough in operation for final judgement to be passed on its success.

The provision of technical training for machine operatives is less far advanced. The Nottingham and District Technical College has recently instituted a course of training for operatives in the Lace Furnishings section, which is well attended and appears to be shaping well. The course consists of part-time day classes, occupying two years, on the structure and operation of the machine, including practical experience in operating a model machine recently erected in the Technical College. There is no comparable provision for training in the other sections and centres, though the provision of technical training for Leavers operatives in Long Eaton has been suggested to the Derbyshire County Council Education Committee. Similar provision has also been under discussion in the Scottish area, but is held up by lack of accommodation. In the south-west one firm has made arrangements for juveniles in their employ to attend two classes a week in the firm's time on the operation and construction of the plain net machine, in addition to the provision of general education on Saturday mornings. Part-time arrangements of this kind will in the future have to be brought into relation with the policy of the Local Education Authorities concerned with further education of juveniles.

The Delegation of the Working Party which visited France inquired into the methods employed in the French industry for the training of juvenile entrants. In the machine-made lace industry special arrangements exist only in Calais,* but in Caudry technical training for operatives on curtain machines was about

* At Le Puy-en-Velay, the centre of the hand lace industry of the Haute-Loire, training in lace-making for girls entering the industry is provided by the Conservatoire under the direction of M. Chaleyé. Some preliminary training is given in the local schools, after which a three months' intensive course is provided at the Conservatoire at the expense of the State. There are three groups of 36 pupils; each pupil passes through all three groups spending a month in each, during which she receives instruction in all types of lace, from the simplest grounds to the most complicated patterns. The course was instituted to arrest the decay of skill in hand lace making which was believed to threaten the traditional industry.

to start. At Calais a remarkably thorough and well-planned training course of four years for boys and girls entering the Leavers industry has been in operation for a number of years, and is still flourishing despite the destruction of the school during hostilities. The first year's course is a general one covering both design and making, and including practical experience in operating machines. After the first year students specialize in either designing and draughting or in machine operation; there are classes also in winding, warping and mending. The students make a contract for four years, of which two (and sometimes three in the case of students specializing in designing and draughting) are occupied by full-time tuition in the school or art centre, and the remainder by practical work in factories. During the whole of this time they are paid at learners' rates plus a proficiency bonus. The school is financed by the municipality, and the students' wages are paid from a fund provided by a 2½ per cent levy on manufacturers based on their wages bill.

The question whether training is best given in the factory alone, whether factory experience is more easily acquired when preceded by a well-planned course in a technical college, or whether a factory training supplemented by part-time training in a technical college yields the best results, is one on which different views are held. We believe that wartime experience both in industry and in the Forces suggests that a short period of concentrated instruction by trained full-time teachers, if well planned and executed, will enable young recruits to acquire skill more quickly and to obtain a wider understanding of the industry valuable to themselves and their employers. We therefore recommend that well-balanced full-time and part-time courses be instituted and maintained at the College of Art and Crafts and in technical colleges in the main lace centres, leading up to a Diploma or Certificate in Lace Production. The courses should be adapted to meet the needs of the various sections of the industry, and should be planned by the Local Education Authorities in consultation with representatives of both sides of the industry. The length, and in consequence to some extent the nature, of these courses will be affected by the conditions of National Service. We believe that a three-years' course is desirable, and consider that, so long as National Service is enforced, deferment should, if necessary, be given to students in their final year. We believe that steps should also be taken to make instruction in the factory more systematic than is often the case at present, and we consider that in all sections where it has not been done already, the methods of training should be fully reviewed by both sides of the industry. Particular stress should be laid on the importance of personal interest by management and foremen in the new entrant and his problems, and the need to select as trainers those who have the capacity to impart their knowledge.

(3) *The recruitment of adult workers.* The opinion is often expressed within the industry that adults cannot be trained for the most skilled work in the industry, while others who do not subscribe fully to this extreme view, consider that only adults already trained in some form of textile industry can achieve proficiency. To accept these views would be to adopt a counsel of despair, for, as has been indicated above, there is no hope under present conditions of rebuilding the labour force of the industry from juveniles alone. Fortunately, however, certain employers who have trained adults in recent years have found that satisfactory results could be obtained, if due care is taken in the training. The experience of other industries during the war would seem to support their

views. We consider that efforts must be made to recruit adults and that special arrangements should be made for training them. In this connection we would draw attention to the 'Training within Industry' scheme of the Ministry of Labour and National Service.

(4) *Training in personnel management and other recent developments in managerial technique.* There would seem to be room for the provision of instruction in the various techniques of management developed during recent years. This should be arranged both for those already employed as foremen, overlookers, managers and executives, and for those who are likely to obtain such positions. It is suggested that the possibility of instituting such courses, or of arranging for participation in courses intended to apply to a wider field of industry, should be examined in consultation with the Ministry of Education, and with the British Institute of Management, which we understand is shortly to be set up.

(5) *Scientific training.* The lace industry is generally acknowledged to be highly technical in character, and to demand of those in its higher ranks, not less than of others, a skilled knowledge of its technical processes. We fully endorse such views, but go further in believing that there is scope and need for scientifically trained men or women both as directors or managers and as specialists. Their fundamental training should be in mechanical or electrical engineering or in physics or chemistry, followed by a wide study of yarns and fabrics and textile processes and machinery. The aim of such training should be to provide specialists with a detailed knowledge of one or more sciences which they personally can bring to bear directly on their work for the industry, and to give to future directors and managers an appreciation of scientific methods and equipment. It must be realized that for some years to come the numbers of scientists which could be obtained are bound to be small in view of the shortage of scientifically trained persons in this country.

We therefore recommend either the recruitment of men or women already trained as engineers, physicists or chemists, or the scientific education of some of those already destined for entry to the higher ranks of the industry, and urge that a trial be made of giving them some measure of scope in suggesting and using adaptations of their training to the operations and needs of the industry.

(6) *Special problems of the recruitment and training of women workers.* The shortage of women workers, and particularly of outworkers, is already being felt in the industry and is severe in the Midlands area, even with production at its present low level. As production increases this shortage is likely to be a bottleneck. It is essential that all means should be examined of finding women workers and of making use of any who offer themselves. The best means of attracting and using part-time women workers deserves further thought in this, as in other industries. The search for outworkers has already carried some machine-holders and finishers far afield, but a more systematic examination, in co-operation with local officials of the Ministry of Labour and National Service into the existence of untapped resources of immobile women workers, e.g. in the mining villages, seems to be called for. The disadvantages of distance and of inexperience can to some extent be overcome by the setting up of local training centres and workrooms in which the work can be done under supervision.

CHAPTER XV. DESIGN

QUESTIONS of design, now being widely stressed among the problems of many industries, have always been a major preoccupation for most sections of the lace industry, since the demand for their goods depends largely, and in some cases exclusively, on æsthetic appeal. The machine-lace industry inherited from the great hand-lace industry of the past a highly developed tradition of design which, particularly in the Fancy Lace sections, still conditions much of its production. Design thus implies not only the choice of pattern, but also the use which is made of the various techniques of lace production, including the combination of various fibres, finishes and colours, to obtain the effects of light and shade, the balance of open and close work, the emphasis of outline of patterns and other qualities characteristic of this medium.

From an early date the machine-lace industry has sought to achieve on the machine designs and qualities comparable with those produced by hand and to adapt its products to the æsthetic or utilitarian needs of its day. In addition, constant attempts have been made to develop new designs based on the same technique or on extensions of that technique. In these attempts the industry has met with varying success. In fancy laces the French, with their traditional skill and taste in textile design, and subject as they have been to the influence of the great Paris fashion centre, were long held to outclass British designers, though good British design always existed and of recent years is held to have become much more general. In the field of lace furnishings, the influence of tradition has been less felt both in this and other countries. Without so strong a background of tradition, this section has at the same time offered a wider scope for innovation and incurred a graver danger of going seriously astray.

Where a sound tradition of design exists in an industry, good results are more likely to ensue by building on the past than by ignoring it; but in each age there develops a certain predominant trend of taste to which all products depending on æsthetic appeal must in their different ways pay homage if they are to retain their popularity. This trend almost inevitably embodies a degree of reaction against the canons accepted by the age immediately preceding it. There are no doubt certain principles of design which apply to all media at all times. In each industry there are also certain technical considerations, the influence of which must always impinge on design—e.g. in the lace industry a detailed design planned for reproduction in a fine gauge or quality is debased by reproduction in a coarse gauge or quality for which, however, equally good designs can be made. Similarly a clumsy use of the resources of the technique of lace production in achieving effects is immediately noticeable to the expert observer. Many judgements of design are, however, of a more transitory character, depending on the prevalent trend of taste of the period and liable to gradual or even sudden change. In general, such changes are more rapidly felt by those consciously interested in and fastidious about design, but they tend gradually to filter through to wider sections of the public. To some extent such trends are international in scope, but national or even local fashions or circumstances influence their expression to a greater or less extent. The increasingly widespread public interest in design and the lead given by press, films and radio seem likely, under modern conditions, to reduce the time needed for changes in taste to affect the population as a whole.

The problem of selection or adaptation of design is thus highly complex for the producer. He must of necessity cater for a variety of tastes, but for tastes

which are moving at various speeds in the same direction. If he fails to perceive this direction he will, in the long run, have failed to adapt his product to the requirements of his age, but in the short run he will also meet, particularly in less sophisticated sections of the market, all degrees of more conservative taste among those who still demand the goods which, rightly or wrongly, gave pleasure to their forbears. In general, all that can be said is that for success a lace producer, like the purveyor of any other goods of æsthetic appeal, requires good taste, an awareness of the predominant trends of design in his time, the power of translating them into terms of his craft, a firm grasp of the major principles of design as applied to lace production, and good sense in judging when and how far to move away from established practice.

We are not convinced that throughout the industry as a whole, though there are many notable exceptions, there is either sufficient awareness of contemporary trends of design or a sufficiently conscious attempt to translate them into terms of lace. Nor do we feel that in every section of the industry there is as yet as widely diffused a sense of style as there might well be.

The organization involved in the development of a design is essentially threefold in character—the designer, the draughtsman, and the card-puncher—and transforms an artistic drawing into a mechanical adjunct to the lace machine. It is the function of the designer to visualize and delineate a pattern which is æsthetically satisfying and promising of commercial success, while that of the draughtsman is to adapt the designer's work to the fabric and machine for which it is intended, and to translate the design on to a chart specially constructed to be read by the card-puncher and his staff. In addition to artistic vision the designer must have a sound comprehension of the mechanical opportunities and limitations of his medium, whereas the draughtsman must combine a skilled knowledge of the lace machine with some understanding of the aims of design. A clever draughtsman can go far towards turning an indifferent idea into a good design; a bad one can ruin a beautiful design. 'Copyists' are employed as well as draughtsmen; they are often draughtsmen in training. There are a few designer-draughtsmen, but it is more usual to specialize. The man who combines these functions is in danger of designing with an eye to ease of draughting, and thereby of losing both his originality as a designer and his ingenuity as a draughtsman. The designs, on leaving the draughtsman's hands, are transferred to cards, for use on the jacquard attachment, by skilled card-punchers, working either as independent firms or as employees of the machine-holders.

Designs are ordered by machine-holders or finishers, and reach them (*a*) from trade or free-lance designers, (*b*) from outside sources such as purchases from abroad or from casual designers, and (*c*) from designers employed by individual machine-holders or finishers. A trade, or free-lance, designer is one who works for the industry either alone or with a number of employees, selling designs as the final product of his business. Machine-holders and finishers who employ their own designers often purchase additional designs from trade designers or from outside sources in order to increase the range of their designs, since the output of each designer may become stereotyped or 'marked by his own handwriting'. Similarly, there are independent firms whose sole work is draughting or card-punching, as well as draughtsmen and card-punchers employed by machine-holders.

It is particularly unfortunate that, at a crucial period in the history of the industry, circumstances have sharply interrupted the progress of design within

TABLE 68

EMPLOYMENT BY MACHINE-HOLDERS OF DESIGNERS, DRAUGHTSMEN AND CARD-PUNCHERS IN 1937 AND 1946*

	DESIGNERS AND DRAUGHTSMEN				CARD-PUNCHERS				TOTAL			
	1937		1946 (31 March)		1937		1946 (31 March)		1937		1946 (31 March)	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
1. Leavers	97	17	13	—	12	—	5	—	109	17	18	—
2. Lace Furnishings:												
(*a*) Scotland . . .	33	34	17	5	43	5	7	—	76	39	24	5
(*b*) Nottingham . .	26	2	6	1	36	2	4	—	62	4	10	1
3. Embroidery . . .		not	known			not	known		27	10	5	4

* The female workers are largely 'readers off' and 'copyists'.

it. The interruption of the normal activities of the industry by the war and the consequent cessation of work on design came at the end of a long period of difficult trading conditions. As a result, the return of peace finds the professional designers, draughtsmen and card-punchers predominantly elderly and seriously depleted in numbers. There can be little doubt that the industry, when it is able to resume full production, will feel the need of new blood in these ranks, particularly amongst the designers, and will be seriously affected by the prolonged break which has occurred in recruitment.

We have sought to collect evidence on which to base an estimate of the number of designers and draughtsmen which will be required by the industry when it comes into full operation. We have had very partial success in the task, though we have sufficient material to indicate the gravity of the present position. Table 68 shows the number of designers and draughtsmen (returned under one head) and card-punchers employed in 1937 and on 31 March 1946 by the machine-holders in the three most important sections concerned. We have no figures for the employees of finishers (relatively few in number) or for the commission designers, draughtsmen and card-punchers, but we have every reason to believe that the trend among them runs parallel to that shown among the employees of machine-holders.

The gravity of this decline in numbers is increased by the predominance of elderly persons among those now at work and the long training necessary to produce designers, draughtsmen and, to a less extent, card-punchers. These figures also serve to give some indication of the opportunities available for those considering taking up these employments.

In an interim report we have already asked that the attention of the industry be drawn to the serious position in which the commission designers, draughtsmen and card-punchers find themselves. The need for early recruitment of draughtsmen and card-punchers must also be urged. The question of recruiting designers is more complicated because of the unusual qualities required for success. It is true that not all the designers employed in the industry can, or indeed need, be of really first-class quality. There is room for those who can collaborate with other more gifted designers or with such proprietors of machine-holding or finishing firms as themselves take the lion's share in initiating designs. It is, however, essential that the industry's designs should be of high standard and therefore that a large proportion of the designers should be of the best quality.

We have discussed the problems of recruitment and training of designers with the Principal of the Nottingham College of Art and Crafts, with a number of designers in the Leavers, Lace Furnishings and Embroidery sections, with representatives of the Council of Industrial Design, the British Colour Council, and with well-known authorities on lace and embroidery. Designers are unanimous in declaring that, irrespective of the exact nature of his training, a lace designer does not reach full proficiency for some seven or ten years. His training may follow any of three paths and all can prove equally successful; he may be trained as an artist, as a textile designer or as a lace designer, and the training may be obtained in a studio, in an art school, or in the design-room of a trade designer or firm, or in two or all of these alternatives. In general, however, it is held that the best training is a broad grounding in art under conditions which stimulate the student's imaginative and artistic powers, followed by a more specific training as a lace designer; nevertheless, it is worthy of note that the production of good design in lace by men and women whose experience and main interests lie elsewhere is

by no means unknown. We do not feel able to commend one method of training more than another, and welcome the freedom of choice, since the development of artistic merit is so much a question of individuality. We do, however, urge the necessity of a wide artistic background, and have been impressed by the probable value to the industry of a further period of artistic study at one of the great recognized centres of art for students who have shown exceptional promise during the preliminary training.

The courses of instruction provided by the Nottingham College of Art and Crafts, in conjunction with the Nottingham and District Technical College, appear to be on sound lines (see pp.120–1 above) though the present two-years' course might be lengthened with advantage to three years. The introduction of a Diploma or Certificate to be gained by examination at the end of the course would be useful to eliminate unsuitable candidates and to enable the best students to show their quality. In the Session 1945–46 there were in the Leavers classes 15 full-time, 12 part-time and 14 evening class students; in the Schiffli embroidery classes two part-time and one evening class students, and in the Curtain classes three part-time students. In the 1946–47 session there were, on 1 November 1946, in the Leavers classes 15 full-time, 17 part-time and 28 evening class students, and one part-time student in both the Schiffli embroidery and Curtain classes.

Recruitment through the channels just outlined, though it may ultimately be adequate to serve the needs of the industry, will take some time to become so, particularly as the wastage among trainee designers is very high. Insofar as this wastage represents the elimination of the unsuitable, it is of course to be welcomed, but much of it has arisen in the past from the transfer of trainees to other forms of trade designing; in fact, the lace industry was failing to retain its recruits. Some transfers are no doubt inevitable, but others may be preventable, and we have given some thought to this question. It is important to make the career of the lace designer as attractive as possible if the right kind of recruit is to enter and remain with the industry. The remuneration of the trade designer depends on his ability and the demand of the industry for his products, and the remuneration of the employee-designer necessarily bears some relation, allowing of course for his relatively greater security, to what he might expect to earn if he set up as a free-lance. In addition to remuneration there also arises the question of status and conditions of employment. The first-class designer can only be expected to turn out first-class work if it is borne in mind that he is an artist. Opportunities to refresh himself by visits to other centres of lace or embroidery design, to study cognate art forms and to keep in contact with the æsthetic trends of his time are essential to him, as are quiet and pleasant conditions of work in suitably lighted and cheerfully furnished rooms. In the view of some of the witnesses we have heard, these needs are not always fully recognized by employers. Without entering into a discussion of the justice, or otherwise, of these criticisms, we would emphasize the extreme importance for the industry of generous remuneration for designers, recognition of status, the best conditions of work, and opportunities for renewal of ideas. The designer has been rightly called the lynch-pin of the industry; the British industry, with its great record of successful innovation in production, has perhaps been less conscious than it should be of this fact.

The importance of making conditions of work attractive is greatly enhanced during the years immediately ahead by the urgent problems of filling in the gap until the young recruits are qualified to play their full part. During this period

it would seem important for the industry, if it is not to stagnate, to increase the number of its designers by attracting the interest of designers in other industries who, with a comparatively short training, could adapt their skill to the medium of lace.

The value of supplementing the work of the designers in the industry from these sources even in normal times is worthy of serious consideration, whether by making contact with the art schools of cities other than Nottingham, or by providing special training for persons with experience of other types of design. The employment by the larger firms, or by the industry as a whole, of well-known design experts as consultants to stimulate and assist in the development of new designs commends itself to us.

As important as the training and employment of first-class designers under conditions that encourage good work, is the need to keep the industry as a whole, and the designers in particular, in touch with developments in other related industries, and to stimulate among buyers and consumers an interest in and an appreciation of good lace. In considering methods to be employed it seems necessary to make a distinction between the Fancy Lace sections, whose products are primarily for use on women's clothes, and the sections producing lace furnishings whose products are almost exclusively for household use. It is argued, and we think correctly, that the problems of these two groups of sections of the industry differ considerably. The use of fancy laces is intimately bound up with style and fashion in a wide range of other materials and accessories used in women's clothes, with developments in which the fancy lace industry must keep in touch if it is to adapt itself to the ever-changing commands of fashion. Moreover, fashions in women's clothes, though presenting many local variations, are dependent on the lead given by a few great centres and on styles created by a small coterie of dress designers. On the other hand, trends of fashion in curtains and napery of whatever materials change with less rapidity than in women's clothing. They are, however, considerably affected both by changes in architectural design and by developments in furnishing and upholstery styles. Such fashions vary sharply from country to country, depending little on the dictates of any international fashion centre. The problems of the lace furnishings industry are therefore those of successful competition with curtains and napery of other fabrics.

In consequence, while the problem of the Leavers and other Fancy Lace sections is to keep themselves in close touch with a few great centres, that of the Lace Furnishings section is to investigate the styles demanded by a variety of markets and to stimulate sales to them, largely through direct publicity to the consumer. For both the producers of fancy lace and of lace furnishings, however, though for somewhat different reasons, contact of a special kind with London is desirable, and to further the interests of both combined effort is required, since the scope of activities demanded is far beyond the resources of the individual firm. The action required in the Lace Furnishings section on overseas and, to some extent, on home markets, though it involves strenuous efforts to adapt design to the needs exposed by market research, is in the main a problem of Distribution and has been dealt with in Chapter XII. On the complex London market, however, it would seem that the interests of the section can best be served by participation in the arrangements recommended for the Fancy Lace sections to assist them to make and maintain contact with West End trends of design, and to foster an enlightened public interest in good design in lace

products. To meet the needs of the Leavers and Embroidery sections, and to further some of the interests of the Lace Furnishings section, it is recommended that a Design Committee be formed and a Design Officer be appointed by it to take charge of a Design and Fashion Centre to be set up in the West End of London. The centre might either have separate premises or form part of a wider organization designed for a number of related industries. The latter alternative appeals to us as likely to be convenient and stimulating for those using the centre. The Barmen and Warp Lace sections, and that part of the Plain Net section which is concerned with dress net, might also be associated with the activities of the Committee and Centre.

The Design Committee and the Design Officer should be responsible for (*a*) the direction of the Design and Fashion Centre, (*b*) establishing contacts with other related industries, (*c*) co-operating with the Nottingham College of Art and Crafts, and other art schools, in instituting refresher courses for lace designers and special training for designers with experience in other types of industry, and (*d*) the discovery and registration of free-lance designers. The Design and Fashion Centre should serve to give a common meeting place for lace designers, West End and overseas buyers, fashion writers and the public. Its functions would be:

(1) To study problems of design in relation to the lace industry.

(2) To study trends of style in industries closely connected with the lace industry.

(3) To collect and bring to the notice of machine-holders and finishers samples of competing and complementary products of interest to them, and of lace products from foreign centres of production.

(4) To hold exhibitions at home and overseas, and to organize participation in other exhibitions.

(5) To these more general functions there should be added a more specific one to ensure the vitality of the Centre itself. It is suggested that it should commission designs which would be at the disposal of the trade and might be exhibited as practical illustrations of the trends of design to which the Centre is drawing attention. While the detailed arrangements for this would require consideration, we consider that activity of this kind is important to prevent the Centre from becoming either dilettante or doctrinaire.

It would seem that the headquarters of the Design Committee could most conveniently be at Nottingham, both as the centre of much of the production involved and as a common meeting ground, and it might be argued that the Centre should also be there. There are, however, marked advantages in having such a Centre in London, and we consider that the advantages of close contact with the West End outweigh the disadvantages of distance from the lace-producing centres. The financing of this Centre and its significance in the plans for distribution are discussed in Chapter XVII. It should be emphasized that the Design Centre should neither compete with nor oust from its position the Library of Lace Designs of the Nottingham College of Art and Crafts. This serves, and should continue so to do, a valuable and most useful purpose as a standard reference library for designers and others in the industry, not only in

Nottingham but elsewhere, and provides a wealth of material and inspiration in the training of designers. The Library and Centre are thus complementary in functions, and each should reinforce the other with mutual support.

There are two minor issues with regard to design on which it has been suggested that we should make recommendations. The first of these is the limitation of the number of designs with a view both to improving the average quality of design and to increasing the length of production runs. We are not convinced that compulsory limitation of the number of designs is practicable or would achieve these purposes; on the contrary we would deplore arbitrary interference with the all-important enterprise in design. In the coming period of high demand, however, we hope that machine-holders will be in a sufficiently strong selling position to establish, in co-operation with their customers, sound principles of production policy, including some concentration on longer runs.

The second issue is that of the copying or piracy of designs. Designs can be protected by registration, and cases of alleged infringement are dealt with by arbitration, the arbitrators being usually appointed, with the consent of both parties, by the Lace Federation. The industry is by no means satisfied with the system of registration.* Not only is it more costly than the systems employed in France and Switzerland, but the searching of records to establish the date and facts of registration is so slow as seriously to reduce the usefulness of the protection which the system gives. In consequence comparatively few designs are registered. In France and Switzerland the arrangement whereby one or more patterns may be deposited for a small payment with the local Chamber of Commerce in a sealed and dated envelope, appears to work well. It is recommended that the industry should examine the working of these arrangements and should consider the desirability of their introduction in this country. Further, in France summary methods of jurisdiction take the place of arbitration, but these are not of a kind to be easily grafted on to English law, and it does not appear that in practice reliance on arbitration rather than legal process leads to unsatisfactory results.

In general, it would seem that the colourable imitation of designs causes less inconvenience than the appropriation of novel ideas and their debasement by inferior but modified reproduction. This is an abuse from which the trade has suffered seriously. It is an activity which can unfortunately be carried on without infringement of any rights, and it is regrettable that the border lines between legitimate enterprise and undesirable activities are too shadowy to make practicable any legal protection of the designer or his employer. Only loyalty within the industry and an attitude of censure towards transgressors can obviate such faults.

CHAPTER XVI. SCIENTIFIC AND TECHNICAL RESEARCH AND DEVELOPMENT

LIKE most other textile industries, the machine-lace industry grew out of a craft, that of traditional hand lace, and was not born of scientific research. In addition, it has always been, and still is, essentially a cotton industry. It is therefore appropriate to refer to the survey which the Cotton Working Party has made of

* The use of registration has been falling over a number of years. In 1908, 5,865 lace designs were registered, and in 1913, the peak year, 7,586. There was a drop to 1,145 in 1920, a recovery to 2,042 in 1930, and then a steady decline to 738 in 1938, after which practically none were registered.

some of the problems confronting the cotton-using textile industries under the heading 'Characteristics and Conditions of the Cotton Industry' (Cotton Working Party Report, pp. 126–29). It would be out of place to embark on a similar analysis here, but we would draw attention to the general implications for the lace industry, and in particular to the summary in para. 17, p. 128.

Some definition of research and development would not be out of place, and we feel it would make for uniformity if the terms and classification used by the Cotton Working Party (Report, p. 124, para. 3 and p. 131, para. 27) are adopted. There are thus:

(*a*) Fundamental Research, the pursuit of scientific knowledge primarily for its own sake.

(*b*) Operational Research*, the use of scientific method in the study of practical industrial problems.

(*c*) Applied Research, the application of scientific knowledge to the improvement of industrial production or practice. This would broadly cover:

(i) devising improved or new processes, new products or new qualities† in existing products;

(ii) solving particular technical problems as they may arise in day-to-day industrial operations;

(iii) devising improvements in conditions affecting the health and general well-being of those working in the industry.

(*d*) Development, the pursuit of results in applied research to the point of full commercial exploitation.

It will be obvious that the divisions in this classification are not hard and fast, and that the four groups may merge into each other in the sense that the successful accomplishment of a project may even involve investigations which can be classified in all groups.

The flood of technical development which followed the introduction of the early lace machines was succeeded by a long period, extending up to the present time, in which, considering its duration, surprisingly few fundamental changes occurred. Machines, it is true, grew progressively wider, and moved faster; rayon arrived as a new fibre, to be used in increasing quantities; auxiliary machinery, such as automatic threading machines, appeared to replace or supplement hand labour; and other changes of similar significance could be mentioned. None the less, the industry remains in its essentials the same as it was in the days of our grandfathers.

In very broad terms, therefore, in the past the lace industry has shown little interest in research. The total expenditure by individual firms on private investigations has probably been small, although it must be realized that, since it is not possible to obtain actual figures of cost or man-hours expended, this statement may do less than justice to some firms. Moreover, contribution to co-operative research by membership of research institutions such as the Shirley Institute of the British Cotton Industry Research Association was by no means universal, although certainly fairly common. In the last two or three years signs

* We have made recommendations for the institution of operational research in connection with the deployment of labour. Recommendations 13 and 14.

† The term quality is used here in its customary sense of an attribute or property, and not in its meaning peculiar to the lace industry.

of a changing attitude have been seen, especially amongst the more progressive manufacturers, but it is our strong opinion that many of the present pressing problems of the industry have arisen because of its failure over a long period to investigate systematically and scientifically the textile, engineering and other aspects of the trade. This lack of concern over research was by no means peculiar to the lace industry, but was general amongst most long-established trades; they were not 'research-minded'.

This criticism, applied to the lace industry without some amplification, would be misleading. It is true that the industry as a whole has not turned naturally and at once to scientifically planned research, whether of long- or short-term character, in the solution of its problems. It is also true that it does not carry out any fundamental research, and that in the firms which do carry out applied research there is a marked tendency for investigations to be sporadic, to be begun during slack periods of production and to be postponed when business again becomes brisker. We have found no evidence of staff retained solely for research or of individual research departments, and only very few firms reserve special machines or equipment for research. Except in the Dressing section, the industry has no scientifically trained staff, and investigations are carried out either by manufacturers themselves or by their managers or foremen in the intervals between other duties.

On the other hand, it should be stressed that no industry could achieve products of such technical excellence as lace fabrics without a background of continual inquiry and trial, and it is proper to emphasize that in one aspect of these, every machine-holding and finishing firm is active to a greater or lesser extent. New designs are constantly being brought forward, involving experiment in the effects attained by variations in type and counts of yarn, and not infrequently the success of a firm has depended on the manufacturer's initiative and efforts in this direction. Warehouse firms have experimented with the packing of various types of goods. Investigations of improved processes of winding and warping are more or less constant preoccupations in many machine-holding firms, and in a few cases consideration is being given to minor mechanical devices to assist in various stages in production. It is questionable, however, whether inquiries into the use and handling of different yarns have in general been prosecuted with sufficient system to yield their full potential value, and investigations not infrequently prove to be merely applied research of a short-term character instituted to solve specific production problems, and shelved when these have been overcome sufficiently for the needs of the moment. No doubt there are exceptions, but since results are jealously guarded by firms, and there has been no clearing-house of information, it is difficult to define them in detail.

Mention must also be made of the valuable services rendered to many firms by the Textile Testing Department, until very recently a part of the University College of Nottingham, and of the important advice and assistance given to sections of the industry and to individual firms, not only by Research Associations of the Department of Scientific and Industrial Research, such as the British Cotton Industry Research Association, the British Launderers' Research Association, and the Wool Industries' Research Association, but also by the industrial organizations handling rayon.

We have given some thought to factors which appear to have exercised a pronounced influence in restricting the development of research in the industry

as a whole, and consider that the four following deserve mention. First, the two sides of the industry dealing with lace machinery, the machine-holders and the machine-builders, have not been in sufficiently close contact; this lack of co-operation may be due to the fact that the life of a lace machine is so long that the replacement rate is slow and the demand for new machines consequently small, but it is none the less to be deplored (see Chapters III, and V, pp. 38–40 and 72). Second, although many directors and managers are highly skilled in the technical or commercial aspect of lace production, the industry is, and always has been, almost entirely lacking in scientifically trained personnel in its higher ranks; lines of directive thought, therefore, may not always tend to follow scientific development and method. Third, a marked characteristic of the industry since its inception has been an intense individualism, which has prevented for far too long a united approach to technical and other mutual improvements. Had the component firms, each or in a large proportion, been active in research the separation would not have been serious, but such omissions are cumulative and, as matters now stand, the industry is faced with a formidable and extensive range of problems, many of which must be solved quickly. Fourth, a point of view has been put to us as defining the attitude of many machine-holders, namely that their function is to process yarn supplied to them in a finished state with machinery planned and built by others, and that in consequence little or no investigation is required of them other than innovations in design and yarn utilization and handling. We feel that such limitation of functions is too restrictive for progress and that it could only operate in a system where the needs of the lace industry would be far more closely integrated and cared for than can reasonably be expected.

Experience of co-operative research and production gained during the recent war, when firms and sections of the industry were concentrated and worked towards a common end, for example in the development of the products of the industry for war purposes, did much to expose the less desirable aspects of individualism and to persuade manufacturers of the practicability of collaboration in research. A general realization of the great need for stress to be laid on technical policy and research led to the formation of a Technical and Research Committee of the Federation of Lace and Embroidery Employers' Associations in January 1944; each section of the industry, and also the machine-builders and yarn interests, were represented. At its first meeting in March of that year the aims of the committee were defined as:

(i) To encourage research and technical improvements in all sections of the industry to fit it for the keen competition of the post-war era.

(ii) To initiate specific experiments.

(iii) To obtain, when possible, supplies of new yarns or materials for the trade as a whole.

(iv) To watch technical inventions and developments and study them in relation to the lace industry.

The formation of this committee thus inaugurated a new era by inducing the whole industry to pool its common technical problems and to join in their solution, and during the subsequent year a number of discussions and descriptions of experimental work took place. It soon became evident to the Federation, however, that this committee, although it represented a long stride out of the

past, was lacking in three essentials for rapid, exact and extensive progress in the aims outlined above. It had no funds for research. Its composition of busy manufacturers, who could only give occasional and part-time service, was unsuited to the systematic collection and application of existing information and to the detailed planning and co-ordination of experiments. The deliberations of its members would be stimulated by contact with relevant ideas brought from outside the industry.

In June 1945, therefore, a Lace Research Council of the Federation of Lace and Embroidery Employers' Associations was formed, consisting of the members of the former Technical and Research Committee of the Federation and the professors of botany (industrial mycology), chemistry, electrical engineering, physics and textiles of the University College of Nottingham, appointed individually. One deficiency was thus partly met.

At this stage the Federation did not feel disposed to proceed to the inauguration of a fully constituted Research Association under the Department of Scientific and Industrial Research, partly because a policy of cautious progress was preferred and partly because before the war, and in 1945, when the Lace Research Council was set up, the level of trade had been low and it was unlikely that adequate funds for a more ambitious scheme would be forthcoming until members had gained confidence in the council's work. Having resolved, however, to guarantee an income of £2,000 per annum for a period of three years, the Federation approached the Department with a view to obtaining Government assistance. As a result, the Committee of the Privy Council for Scientific and Industrial Research proposed:

> 'for an experimental period of three years commencing 1 April 1946 to pay grant to the Research Council on the following [and other relevant] terms, or on such modifications as the Committee of Council may deem expedient. The Federation will, in respect of each year, endeavour to raise for the general research purposes of its Research Council, income, approved by the Committee of Council as grant-earning, amounting to not less than £2,000. Provided that this sum is raised, the Committee of Council propose to make to the Association [Research Council] a block grant of £2,000. Further, for every complete £100 by which the approved grant-earning income exceeds £2,000, the Committee of Council propose to make additional grant of £100 up to a maximum additional grant of £5,000 for the year.'

On this basis the total income available for co-operative research for the industry is not less than £4,000, and not more than £14,000 per annum for the three years ending 31 March 1949, although the industry could of course contribute further during that period without a corresponding grant. This proposal was accepted, and the total income from both sources reported by the Research Council as available during the three-year period will be £4,500 per annum.

Having thus some funds at its disposal, the Research Council made a beginning in satisfying its next need, that of full-time staff, by appointing a scientist as liaison officer in research matters to collect and correlate results of investigations of interest to the Council and to organize co-operative research on behalf of the industry. This officer, who took up his appointment at the beginning of September 1946, is a chemist with long experience of textile processes in a particular branch of the textile industry and a practical knowledge of Service operational

research during the recent war. The Council has no laboratories, and the duties of the officer consist in the first place of seeking out problems and conditions facing the lace industry, of liaison with established research organizations, of the inauguration of investigations under contract at Research Associations, Universities, Technical Colleges or elsewhere, and of the dissemination of relevant information throughout the industry by means of bulletins and reports.

The industry is thus embarked on a policy of co-operative research, and we have given some thought as to whether the provisions made are likely to be adequate for the next five years. Although we are charged with a review of the industry on a long-term basis, it is not possible to predict what may be needed thereafter; there is little doubt, however, that the short-term policy on research may influence markedly the long-term prospects of the industry.

During its discussions and visits, we, as a Working Party, or through individual members, have had brought to our notice three or four dozen topics for immediate conjoint research, some of which are in fact extensive in scope and multiple in character. Other lines of fruitful investigation could also be suggested. These problems exist now, and consequently their number takes no account of the many additional projects which will inevitably spring up as the programme of research gets under way and expands. They may be grouped widely under the headings of mechanical, electrical and ventilation engineering; textile, both yarns and fabrics; chemistry; physics; and welfare; with the present bias well towards the engineering and textile aspects. There is naturally overlapping in this classification; and, whereas various problems offer possibilities of an easy solution with but little experiment, or may even be solved or circumvented by consultations with industries in which the necessary information is already available, there is no doubt that a considerable proportion of problems, amongst which are some of importance to the industry's future prosperity, are likely to necessitate prolonged, and in some cases, costly investigations.

The Research Council has mentioned the following as a selection of the more urgent problems which will occupy its immediate attention: graphite lubrication; warping and winding; jacquard strings; standardization of warp needles; handling of new yarns; reduction in mending; chemical finishing; ventilation, temperature and humidity controls in factories; lighting; alternative constructional materials for machines; certain aspects of machine design to reduce noise. In drawing up this list, the Council has been influenced by a policy, which to us seems unexceptionable, that topics which affect the industry as a whole, or a large proportion of it, should be of first priority; that research for individual firms will not be undertaken; and that the needs of the contributing sections must be kept in balance as far as is consistent with urgency in order to avoid the risk of dissatisfaction which might arise, especially in the early stages of the Council's activities, if the programme were unequally distributed.

In view of the short period during which the Research Council has been in existence, detailed description of its work is neither possible nor desirable, but we feel some concern with regard to two aspects.

It is clear that many of the Council's projects come under the heading of engineering, and with this in mind, and the extent and number of projects regarded as urgent, we are of the opinion that the full-time staff of the Research Council should be augmented by the appointment of a scientist with a knowledge of engineering and physics. We feel also that the deliberations of the Council would benefit by the addition of engineering experience drawn from outside the

industry, and urge that the ties between the machine-holders and machine-builders should be strengthened so that research and development on mutual problems may be expedited.

After reviewing the number, nature and probable cost of the more urgent investigations quoted by the Research Council, we feel bound to comment on the question of finance. We are of the opinion that the present level of finance available to the Research Council is too modest to permit a resolute attack on more than a very few of the existing problems without taking into account others which will inevitably come to light. Moreover, the future of the scheme for conjoint research may be jeopardized by reason of the slender investment in it; if energetic attack can be contemplated on only a very few of the industry's problems, delayed success in one or more projects, which must always be faced as a possibility, may undermine the new-found confidence and willingness to co-operate of manufacturers. The Research Council is undoubtedly aware of this danger, but we attach such weight to it as to give it wider publicity.

We consider, therefore, that a more extensive scale of finance will be necessary, and urge that every effort should be made during the experimental period of three years to take full advantage of the very favourable terms on which assistance in research is offered to the industry by the Privy Council Committee for Scientific and Industrial Research. Indeed, the question should be under constant review whether the industry can afford not to inaugurate a fully-fledged Research Association with its own staff, laboratory and workshop. We consider that further observations on this point are unnecessary since we have been informed that the grant from the Committee of the Privy Council is based on the definite understanding that during the three-year period the Federation, if it proposes to continue co-operative research, will submit proposals for a more extensive scheme.

As to the raising of funds for co-operative research, we consider that the only equitable procedure is to raise them out of a statutory levy on the industry as a whole on some *pro rata* basis. We discuss the whole question of compulsory levies on the industry in Chapter XVII.

The admission of the principle of conjoint research and the acceptance of the proposals of the Privy Council Committee, although both will benefit the industry to a marked extent, open new pitfalls for manufacturers. It would be fundamentally unsound, both psychologically and in practice, for the industry to approach research in a spirit which holds that it is worth prosecuting only if rapid successes are attained or that its mere inauguration will sweep away all technical difficulties. Nevertheless, the relatively slight contribution by the industry proposed (less than 0·05 per cent of the industry's turnover in the year 1935) and the caution apparently indicated by the trial period could be construed as suggesting that this attitude may in fact be predominant. In discussing this position with the Research Council, we learned that the modesty of the present contributions was conditioned to some extent at the time when the research scheme was launched by the over-riding importance of setting machines in motion after the wartime stoppage; that amongst the more progressive employers there is enthusiasm for the scheme; and that more general support is likely to be stimulated by contact with the research officer and the publication of his bulletins.

Again, it would be deplorable if the scheme of co-operative research were by its very existence to dissuade manufacturers from the development of new processes and products or to curb a spirit of invention. Rather should individual

and co-operative research move forward together. The line of demarcation is not clear (see the Cotton Working Party Report, p. 138, para. 54 (ii)) and will in any case fluctuate, but the publication of the Research Council's programme amongst members, coupled with the individualism which characterizes the trade, should ensure a sufficient definition, provided that the dangers of mere passive anticipation and reliance on the Research Council are appreciated, and that firms have in their employment men or women competent to carry out research on a planned basis.

The experience of many industries has shown the value under modern conditions of a high educational standard and of a scientific outlook among proprietors, managers and the higher ranks of personnel in general. The lace industry has always been rich in men of technical experience to whose ability and inventive ingenuity the industry owes many debts of gratitude, but the training of such men has seldom been of a kind to stimulate the scientific outlook. While nothing could compensate the industry for loss of technical skill, which fortunately shows no sign of decreasing, the recruitment into the industry of young men of wide educational background and of a scientific attitude of mind would be a new source of strength to it. That the presence of such men in the industry would assist it to make the best use of the results of co-operative research and would help to render fruitful the investigations carried on by individual firms, would appear certain.

CHAPTER XVII. THE RELATIONS OF THE INDUSTRY WITH THE GOVERNMENT

THROUGHOUT this Report we have sought to show the way in which, in our opinion, the prosperity of the industry must depend on the vigour and skill of the individual firms composing it, and the degree to which the task of the individual firm can be lightened by organizations set up within the industry, and by the co-operation of Government Departments. The industry seems to us by its nature peculiarly well fitted for individual enterprise.

We have made in various parts of this Report recommendations which involve the use of a compulsory levy:

(1) For scientific and technical research (Recommendations 55 to 60).

(2) For economic and market research (Recommendations 26 to 29).

(3) For overseas sales promotion (Recommendation 29).

(4) For the establishment of a Design and Fashion Centre (Recommendation 52).*

All sections of the industry have a common interest in the first; they are not all equally concerned in the second and third, and some are not at all concerned in the fourth.

We recommend that powers be sought to raise a compulsory levy for all these purposes, to be collected and applied by sections, but the amount of the levy to vary in accordance with the number of items specified above in which each section has an interest. Thus the total levy on firms in any one section may

* In addition to the uses listed, it might prove desirable to allocate some funds from the levy for purposes connected with recruitment and training.

contain one or more constituent elements. We strongly recommend that every section of the industry should contribute to the funds for scientific and technical research. Furthermore, in disposing of the funds, the necessity of continuity of income for any institution set up should be borne in mind. There are various bases on which it could be raised: e.g. yarn consumption or wages bills, but this can best be determined by the industry itself. Special arrangements for the participation of the finishers are likely to be necessary.

It is recommended that a central committee be set up composed of representatives of all sections of the industry and of the Board of Trade to apportion that proportion of the levy required as the basic minimum for activities affecting more than one section of the industry. The Board of Trade should also have the right of nominating to this committee two or three persons chosen from within or without the trade for their personal qualifications. The rest of the funds raised should be administered under the general direction of the sections which raise them, through committees similar in composition to the central committee, but chosen on a sectional basis, the Board of Trade to be represented on them and to have powers of nomination to them in the same way as on the central committee. These committees should submit annual reports to the Board of Trade and to the industry.*

As an industry depending heavily on export markets, and one which must feel early and severely the effects of any general trade recession, the lace industry is deeply concerned in the success of the Government in achieving favourable conditions for international trade and in implementing a policy of full employment at home. We fully recognize the importance of good and close relations between the industry and the Government Departments concerned with economic policy, and also the necessity for the greatest possible co-operation between all sections and interests within the industry. We have given much thought to the question whether these ends would be served by the setting up of a permanent body of a tripartite nature, on which employers, employees and persons with experience in other types of industry would be represented, to keep under review the problems of the industry as a whole, and to over-see its various co-operative activities. We have come to the conclusion that such a body would not be likely to serve a useful purpose.

As already pointed out, the structure of the industry is complex, and the degree to which the various sections of it are susceptible to uniform treatment comparatively slight. We have suggested above certain extensions of and additions to these bodies. We consider that thus reinforced they are adequate to express both those interests common to all sections of the industry and those peculiar to the individual sections. The channels of intercourse between the industry and Government vary and can most usefully continue to vary with the topics under discussion and the degree to which these topics are particular to single sections or general to the industry as a whole. A tripartite representative body superimposed on the organizations already in existence would add to the cumbrousness of the organization, while it could in no way take the place of any of its parts. It might in consequence prove to be rather a means of delaying than of expediting action.

* The question arises of assessment for Income Tax of contributions to this levy and of liability to taxation of the organizations disposing of the funds. We are strongly of the opinion that contributions to this compulsory levy should be allowable against tax and that the organizations administering it should not be assessed for taxation.

On the other hand we believe that a periodic review of the conditions and problems of the industry by a tripartite body is useful in focusing the attention both of the industry and the Government on matters of major significance to all sections of the industry, and particularly on the changes necessary to keep it in line with changing circumstances. The present Working Party has met at a time when the future both of supply and demand is peculiarly obscure. While some of our recommendations are susceptible of immediate application, others are not. We would recommend that some five years hence a similar body be appointed to review our recommendations, to consider the degree to which they have been implemented, and to make such further recommendations as may seem necessary in the light of the situation as it will have by that time developed.

PART IV Recommendations

A. GENERAL

THE Working Party wish to preface their more particular recommendations with a few of a more general nature.

Their terms of reference make it clear that their proposals must be based on the assumption of the continuance of the system of private enterprise, and they are of opinion that the industry is one peculiarly suited for the operation of this system, provided that it is so organized as to ensure co-operation as well as competition. They have concentrated their attention on the consideration of the problems of production and distribution which seem likely to face the individual firm in the coming years, and on the means whereby the enterprise of such a firm may be supplemented by the co-ordinated activities of the industry or section of the industry to which it belongs, backed where necessary by the authority of the State.

Their concern lies in the long-term interests of the industry and they have ignored the numerous short-term problems facing it except where these are so closely bound-up with the long-term prosperity of the industry that they cannot be ignored. On one general and one more restricted issue of a short-term nature they have found themselves obliged to make recommendations. The restricted issue is the immediate assistance of the free-lance designers and draughtsmen and of the commission jacquard card-punchers. On 3 August 1946 the Working Party made the following interim recommendation as a matter of urgency in advance of their final report:

(1) That the lace manufacturers, through the appropriate associations, should be strongly urged to initiate the production of new designs and jacquard cards in order:

(i) To prevent the key processes of designing, draughting and card-punching from dying out through financial stress or from sinking so low as to be unable to recover to the level that will be necessary when conditions of trade become more normal.

(ii) To ensure the recruitment and training of young designers, draughtsmen and card-punchers, without which the whole future of the Lace Furnishings and Leavers Lace sections of the industry will be jeopardized.

To this interim recommendation the Working Party would add the rider, that the appropriate associations should now review the position to determine whether the measures proposed are proving adequate, and that, if not, they should concert further means of assisting these firms.

Their recommendation on a general issue of short-term character concerns raw materials. The biggest immediate obstacle to the revival of the industry is the present shortage of raw materials. The Working Party are impressed by the serious danger of loss of world markets not only by foreign competition or by the establishment of local industries, but by the permanent diversion of demand to substitute products; they are also struck by the difficulties which will face an industry in building up a labour force under conditions of general labour shortage,

when it is not in a position to press its demands at the same time as other industries competing with it on the labour market.

(2) They therefore recommend that these considerations be borne in mind by Departments in allocating raw materials and that all possible facilities be made available to the industry in this respect.

The Working Party also wish to draw attention to a general issue to which they attribute high importance; the publication of statistics in a form which makes possible well-informed study of the industry's problems. Their work has been rendered slow and laborious by the inadequacy of those published at present and their unsatisfactory presentation.

(3) They have already submitted proposals to the Board of Trade on the form of the future annual Census of Production. They would recommend that a review of the form of the statistics included in the short-term returns of production and the annual Trade Returns be also made in consultation with the industry.

They would pick out three points as worthy of special consideration:

(i) In view of the present unbalanced age composition of the labour force, the need to make annually a detailed analysis of workers by age groups.

(ii) The need to include in the annual trade returns exports by parcel post which form a substantial part of the industry's export trade.

(iii) The desirability of classifying lace products in the annual trade returns by machine of origin in the way suggested in Appendix III.

B. RAW MATERIALS

The gravity of the short-term problem of raw material supplies has already been noted. The Working Party view with concern the probability of a shortage of cotton yarn (which in 1937 made up 86 per cent of the raw materials used) for a number of years. They understand that the shortage is likely to affect most seriously the sections using the coarser count yarns (i.e. the Lace Furnishings and Plain Net sections). For the most part, this problem is one towards the solution of which the Working Party can give no assistance. They feel able, however, after much consideration to make the following recommendation:

(4) That the Lace Furnishings section should consider the practicability of setting up, or encouraging the setting up, in the Development Area of south-west Scotland (an area with a long tradition of skill in textile production) of an up-to-date ring-spindle mill on a co-operative basis for the spinning of 2/32 count yarns with capacity to produce on a two-shift basis some 1,000 tons of yarn a year,* and that all facilities and priorities for the setting-up of the spinning mill be made by the Board of Trade and other Departments concerned.

* The output per annum of a ring-spindle spinning and doubling 32s yarn worked on an 80-hour week is some 90 lb., so that nearly 25,000 spindles would be required to produce 1,000 tons a year. The cost of erecting a mill in 'green fields' is estimated at about £12 per ring spindle, £5 of which is accounted for by the cost of spinning machinery, £2 for doubling machinery and the rest for building. The total expenses of erecting such a mill would be some £300,000 to £350,000; the enterprise would, however, be eligible for the assistance made available to industrial development in the Development Areas.

Consultation with the Lancashire spinning interests on the best means of achieving this object would seem to be desirable.

(5) They would also recommend that the Plain Net section investigate the practicability of a similar undertaking in one of the Development Areas for the supply of yarn of one of the counts for which they have a large and steady demand.

(6) That the Research Council consider the drawing-up of specifications for minimum standards for yarns of all fibres with a view to their adoption by all sections of the industry.

(7) The Working Party also recommend that sections should press on with experiments in the use of substitute fibres, though they consider that the use of these so far as can be seen is likely only to be supplementary to and not in wide-scale replacement of the fibres at present in use.

C. PRODUCTION

The Working Party's recommendations under this head are aimed at maximizing the output per man-hour to fill the gap between anticipated demand and the supply which could be expected from the labour force likely to be available to the industry if no special effort were made to increase its productivity.

I. *Principal Machine-holding Sections*

(*a*) *Plant*

In view of the limited technical advances made in the construction of the lace machine during the past 25 years, there is little, if anything, to be gained by immediate large-scale re-equipment in either the Leavers or the Lace Furnishings section. Machines 50 years old are working well where they have been systematically reconditioned. It is significant, however, that the Scottish lace furnishings firms, whose productivity is markedly higher, have been much more active in purchasing and reconditioning machines than have their Nottingham competitors. In the Leavers section the situation in the years under review has been abnormal in that, while no new machines have been purchased for 23 years and few machines been entirely reconditioned (though a good deal of less drastic reconditioning has been going on), there has been much replacing of the oldest machinery, become redundant through the decline of trade, by newer but still secondhand machines. It is clear that this condition cannot continue indefinitely. In the Plain Net section the urgency of maintaining up-to-date plant is especially great, since the product sells on price and the industry has to employ all available means to maintain its competitive power.

(8) It is recommended that all firms undertake a policy of systematic reconditioning or replacement of machines over a number of years to increase or maintain the efficiency of their plant.

The desirability of plant so balanced as to make economic the installation of bobbin-threading machines should be borne in mind; also the desirability of some standardization in the width of machines and, in the case of curtain machines, the standardization of jacquard ties ('tie-ups').

The Working Party are convinced, however, that a marked increase in productivity could be achieved in many firms by improved maintenance of the machines now in use.

(9) They recommend that:

(*a*) More attention should be paid by some firms to the cleaning of machines. This is a matter requiring the energetic co-operation of employer and worker. The use of industrial vacuum cleaners, the setting aside of adequate time for the cleaning of machines, and the award of premiums for the best kept machines,* are measures that have led to good results in certain factories.

(*b*) In many cases the arrangements for the general maintenance of machines is insufficient. This is due in part, no doubt, to the present shortage of skilled mechanics, but the difficulty for the very small firm must always be considerable unless the proprietor himself be an engineer. The loss in production from this cause may be considerable; members of the Working Party were, for instance, shown a plain net machine under repair in which the worn condition of the bobbin carriages had reduced the output from six to three-and-a-half racks per hour. The Working Party recommend that every firm of sufficient size should have its own mechanic or staff of mechanics and that all sections should consider how to make the maximum use of the skilled labour available to meet the needs of the smaller firms. The encouragement of specialist maintenance firms or of service arrangements with the machine-builders should be reviewed.

(*c*) A main cause of the inefficient running of machines is lack of proper care of the brass bobbins and carriages. These are delicate precision instruments easily damaged, and, if used in a damaged condition, they considerably impair the efficiency of and may injure the machine. The Working Party strongly recommend to all firms the arrangement at present used by every Scottish factory and a few English factories whereby they have a full- or half-time 'shuttle sorter' who is responsible for the examination of bobbins and carriages and the setting aside and repair of those damaged. They also recommend that suitable means be provided for the carrying of bobbins and carriages, and that care in their handling be impressed on all working with them. They consider that two full sets of bobbins and (in the case of all but the Leavers section) of carriages should be available for each machine.

(*d*) Time is often lost and work spoiled through damaged jacquard cards. The attention given to the maintenance and storage of these cards varies widely as between factories. Attention to this important matter is strongly urged.

Though the possibility of increased output through developments in the lace machines appears to be slight, the Working Party are not convinced that the same applies to the auxiliary plant in use, where in their opinion changed conditions may prove to call for the use of new types of plant or the acquisition of yarn in different forms. The use of the bobbin-threading machine, which eliminates the need for juvenile hand-threaders, is increasing. In slip-winding, brass-bobbin winding and warping, firms are trying out various methods tending to economy in labour.

* Care must be taken, however, lest this should tempt twisthands to the dangerous practice of cleaning machines while working.

(10) The Working Party hope that the Research Council will, as has been suggested, hold in Nottingham an exhibition of modern winding machinery suitable for use in the lace industry, and recommend that Swiss and U.S. machinery be included therein.* No effort should be spared to cut out preliminary auxiliary processes in the interest of reducing the demands upon the industry's labour force.

(11) They also recommend that all possible steps be taken to reduce the labour at present required for mending.

An analysis of the main causes of thread breakage is included in Appendix I. An automatic stop to operate when a thread breaks is being and has long been sought; if feasible, it should prove of real value. The problem is twofold: that of finding a stop that would come into operation on the breakage of a warp, spool or beam thread (which presents less serious difficulty), and that of finding a stop which would come into operation on the breakage of a brass-bobbin thread. Though for a full solution both are required, the use of an automatic stop that would operate on the breaking of a warp, spool or beam thread would present certain advantages, particularly if combined with the use of high-grade yarn, less subject to breaks, on the brass bobbins. The use of machine-mending as practised chiefly in Scotland would seem to be desirable as a measure of labour economy in the case of certain products, though mends thus made are less skilfully concealed than those made by hand.

(*b*) *Deployment of Labour*

The Working Party consider that every effort should be made to increase output by achieving the most satisfactory deployment of labour.

As indicated on p. 68 above, it has already been agreed between the Employers' Association and the Trade Unions concerned in the Nottingham Lace Furnishings section, that the method of deployment of labour in use in the Scottish factories may be adopted in the Nottingham area.

(12) In view of the striking evidence on productivity summarized on pages 65–7, the Working Party recommend its general adoption in the Lace Furnishings section as soon as circumstances permit.

Schemes for the more economical use of labour have also been laid before the Working Party by individual members of the Plain Net and Leavers sections. In neither case is the evidence available sufficient to prove or disprove the contentions made.

(13) The Working Party therefore recommend that an investigation be carried out under the ægis of the Research Council into the practicability of any such proposals with a view to establishing their relative advantages in comparison with existing methods.

It is suggested that the experiment be carried out with the co-operation of the owner and employees of a selected firm, under the supervision of an employer, a Trade Union representative and an independent

* The Cotton Working Party recommend (p. 83) that the delivery of yarn on cones (as at present to the hosiery industry) be generally adopted by the spinners. This would seem to present no disadvantages to the lace industry, except in the case of brass-bobbin yarn supplied to those firms who prepare it themselves.

chairman of some technical experience nominated by the Board of Trade. The question of the implementation of such schemes, if they proved technically desirable, would be a matter for discussion between the Employers' Associations and the Trade Unions.

(14) They consider that similar machinery should in the future be employed by agreement of both sides of the industry, for the investigation of any proposals put forward for increasing efficiency, which involve experiment, to establish the practicability or usefulness of the proposal.

II. *Minor Machine-holding Sections*

(*a*) *Embroidery*

(15) The Working Party recommend that manufacturers should take steps to install as soon as circumstances permit some of the 15-yard machines already in use on the Continent, with a view to increasing the output per man-hour in the section.

(16) That since it is understood that the builders of the Swiss machines will only put machines into production if they have orders for a complete run, manufacturers considering re-equipment should take common action in the presentation of their orders.

(17) They recommend that steps should be taken to discover what is likely to be the future position of the machine-building industry of Plauen and that the section should concert with the appropriate Government Department measures for ensuring the provision of replacement parts over a short and long period.

(18) Since it is contended in Continental producing centres that the use of men to work the machines leads to an improved standard of production, it is recommended that the section consider whether or not their contention is applicable under English conditions.

(*b*) *Barmen or Braid Lace*

The Working Party have no recommendations peculiar to this section of the industry.

(*c*) *Warp Lace*

The Working Party have been hampered by lack of precise information in making recommendations for the assistance of this section.

(19) They would recommend, however, that machine-holders operating warp lace machines should consider jointly the means of procuring the manufacture of replacement parts for these machines (such parts are not at present in production) so that by presenting a common programme of requirements they can make the provision of such parts an economic proposition for a machine-building or other engineering firm.

III. *Other Sections*

(*a*) *Dressers*

(20) The Working Party recommend that attempts to find a substitute for the flat frame be persevered in, and that the more up-to-date factory layout and dyeing plant already in use in certain works be generally adopted.

(21) They also recommend that further study be made of the processes of bleaching, dyeing, and dressing used in the industry so as to ensure that they equal (or if possible surpass) those employed in any other centre of lace production. Consultation between the dressers and the machine-holders and finishers on the standards to be aimed at appears desirable.

Regular consultation on other subjects such as lengths of run should prove useful.

(*b*) *Finishers*

(22) The Working Party recommend that all possible mechanical aids to the finishing process be explored and that the installation of clipping machines where they can be used on simpler clipping be investigated to release hand labour for the more difficult clips essential for the production of certain high-grade laces.

IV. *Supply and Finance of New Equipment*

The question of priority of supplies, both of new plant and replacement parts for maintenance has already arisen, and is likely to become increasingly urgent as the industry comes into fuller production. Reasonable priority for the industry's needs is a matter requiring the attention of the Board of Trade. The Working Party are fully aware of the importance of the traditional export of lace machinery and parts. They consider, however, that there is real danger that heavy overseas commitments may jeopardize the efficiency of the British industry (e.g. already the supply of brass bobbins is causing anxiety in some sections).

(23) The Working Party recommend that each section of the industry should draw up a programme of its requirements in replacement parts and new machines over the next two years, or other agreed period, and that discussions on the best way of implementing this programme be inaugurated between the Government Departments concerned, the industry and the machine-builders. A definite allocation of the capacity of the machine-builders for the urgent needs of the British industry seems essential.

(24) The Working Party consider that more generous allowances than are available under the Income Tax Act of 1945 for newly-installed plant are necessary. In particular the initial allowance of 20 per cent appears insufficient in view of the heavy increase in the cost of new plant; an allowance of at least 40 per cent seems justified.

V. *Costings*

(25) The Working Party recommend that each section should take into consideration the establishment of a common principle of costing for use by individual firms.

They are aware of the difficulties which stand in the way of accurate costings in certain sections, in particular, the great diversity of the product, but they believe that these could be sufficiently overcome to enable all firms to acquire a better knowledge of their costs and a sounder basis for establishing their prices than many of them now possess.

The Working Party have stated their reasons for believing that the world demand for lace products is likely to exceed the pre-war level, and that, if the British industry can surmount the difficulties which face it on the supply side, it should be able to obtain a substantial share of the world markets. How big the share can be, however, and indeed how strong and continuous the demand for lace products is likely to be, must depend to a considerable extent on the success which the industry achieves in assessing the needs of the public in world markets, in meeting these needs and in maintaining the interest of this public in their products.

The Working Party concentrate on three issues in their recommendations on distribution: (1) the best means of maximizing demand; (2) what improvements are needed in the distributive processes themselves, and (3) how best to use the distributive machinery to lessen the impact on the industry of fluctuations of demand, including the seasonal fluctuations characteristic of certain types of lace production, and to assure continuity of production.

I. *Maximizing Demand*

The Working Party consider that this involves three questions: (A) those of Market Research, which they subdivide into (*a*) Economic Research (e.g. the study of income grouping, set-up of internal distribution, fiscal systems in various markets), and (*b*) Research into matters concerning consumer preference (here called for convenience specialized research); (B) Those of sales promotion, publicity of all kinds, direct and indirect; and (C) methods of marketing. They believe that the circumstances of all sections of the industry, with the exception of that part of the Plain Net section whose interest lies in the production of net for protection against insects, make some form of co-operation desirable for the adequate solution of the problems covered by (A) and (B) above, though in the case of (A) the importance of such co-operation varies in different sections. On the other hand, the extreme variety of the products offered and the important part played by consumer preference in their sale, make the application of co-operative methods to marketing ((C) above) in general unsatisfactory; marketing problems must be faced by the individual firm.

The Working Party in their recommendations have tried to take into consideration all these factors. They recommend:

(26) That the industry seek powers to impose a compulsory levy on its members (see 63 below) part of which will be used for purposes of co-operative market research and sales promotion on overseas markets.

(27) That the scheme put up in support of this proposal should distinguish between that aspect of market research which has been called economic research on the one hand, and the 'specialized' research which comes under the heading of sales promotion and research into consumer preference on the other.

(28) That economic research be provided for all sections of the industry by setting up a new Economic Section of the Research Council, the cost of which should be met from the levy. (*See* 59 and 63 below.)

(29) That market research into consumer preference and sales promotion be organized co-operatively on the following basis:

(*a*) *The sections producing fancy laces, and that part of the Plain Net section which is substantially engaged in the production of dress nets.* In these sections, while co-operative market research may be of some value, co-operative liaison with the West End of London, largely of an educational kind, is generally admitted to be of much greater importance (see Recommendation 52), and on this it is recommended that they should concentrate for the present.

(*b*) *Lace Furnishings section.* In this section, while liaison with the West End of London is likely to be of value, co-operative market research and sales promotion seem to be even more important. In the export field there are opportunities to open up markets where British interests have previously been small or non-existent, and on the home market (though this is not a matter of immediate concern) there is likely to be scope in the future for the study of regional consumer preference and for the use of means to stimulate and maintain the public interest in the products of the curtain machine. The Working Party recommend that the part of the levy raised from this section of the industry for specialized research should be entrusted to a committee of the National Council of Scottish and Nottingham Lace Furnishing Manufacturers' Associations, on which the Board of Trade should be represented for this purpose and to which they should also nominate selected members (see Chapter XVII), to use in initiating investigations into the needs of individual overseas markets. Members of the section interested in the market or markets affected should be kept in close touch with these activities so that they can follow up the campaigns by well-informed offers of goods. Other sections may find it desirable to interest themselves in similar schemes for market research and publicity. In such cases similar organizations should administer the funds.

(*c*) *The Plain Net section.* While the interests of plain net manufacturers who specialize in the production of dress nets are closely bound up on the distributive side with those of the Leavers and other Fancy Lace sections, this is not true of those manufacturers whose main interest lies in the production of net for protection against insects. The need for co-operative market research and sales promotion for this part of the industry appears at present to be less strong except in the case of the publicity that might be necessary to make known the Trade Certification Mark recommended in 31 (*a*).

II. *Improvements in the Distributive Processes*

(30) The Working Party consider that it is impracticable to examine distribution costs for the lace industry in isolation, but believe that a general inquiry into the costs of distribution is urgently necessary.

They have given much consideration to the question of the maintenance of standards and the ensuring of the consumer against deception as to the goods purchased. They believe that various measures are possible to achieve these ends, although difficulties of definition and the need to compete on very low-grade markets make the establishment of universal minimum standards impracticable.

(31) (*a*) In the Plain Net section they recommend that the industry consider the establishment of a Certification Trade Mark under the control of a suitable certifying organization, which can be applied to net conforming to certain standard specifications, and made known to the consumer by well-organized publicity. It is possible that similar arrangements can be made in respect of limited ranges of the products of other sections.

(*b*) It is recommended that it be made obligatory on all sections of the industry to mark all goods whose 'filling' (i.e. dressing which disappears with washing) exceeds a stated percentage of their weight.

(*c*) It is recommended that the Research Council, in consultation with the British Standards Institution investigate the possibility of devising a satisfactory 'user' or 'durability' test which might become the subject of a Certification Trade Mark.

III. *Continuity of Production*

In considering how best to avoid undue fluctuations and to ensure continuity in production, the Working Party lay stress on the various measures they have proposed for trade expansion, but they have also been impressed by the wartime experience of the concentration companies in which long runs of standardized goods and continuous employment led to a remarkably high annual output. By its nature the industry cannot rely on standardization in time of peace, but suggestions are made (pp. 112–3 above) (*a*) for the use of co-operative sales organizations for the handling of limited ranges of more or less standardized goods in cases where circumstances permit, and (*b*) for the use of purchases from public authorities as a cushion against fluctuations.

(32) The Working Party recommend that these possibilities be carefully examined by the various sections of the industry when winding up their concentration arrangements.

E. FACTORY PREMISES AND WELFARE

The Working Party rank very high the importance of improved working conditions in making possible the recruitment of labour and the maximizing of its productivity. They recommend under this head:

(33) That the desiderata referred to in Chapter XIII, p. 115, be taken into immediate consideration by all sections of the industry, viz:

(*a*) That all premises should be kept in a clean and orderly condition, and that all possible steps should be taken to obviate the necessity of using blacklead (graphite) as a lubricant; the investigations of the Research Council into this problem should be pressed forward.

(*b*) That where necessary artificial lighting be brought up to date, and natural lighting be made as good as possible.

(*c*) That everything possible be done to improve the approach to factories in storied buildings.

(*d*) That cloakroom accommodation be improved where unsatisfactory, and lockers be provided for the use of workers.

(*e*) That the inadequate and unsatisfactory lavatory and washing arrangements found in a number of factories be improved.

(*f*) That steps be taken to provide rest-room, mess-room or canteen accommodation for workers.

(*g*) That adequate provision for dealing with accidents be made available in all factories.

(34) That the extended use of Joint Works Councils be considered as a means of promoting harmony and good conditions throughout the industry.

(35) That in the Leavers, Lace Furnishings and Plain Net sections the problem of suitable factory premises, spacing of machines and layout be treated as a matter of first importance. This recommendation involves, in their opinion:

(*a*) The recognition of certain minimum standards of spacing as essential. It is recommended that:

(i) In the case of curtain machines a minimum of four feet at the base of the machines facing one another; three feet between spool boards at the back, and two feet six inches clear floor space at the ends be provided.

(ii) In the case of Leavers and plain net machines, it is recommended that a minimum of three feet at the base of machines, back and front, and two feet six inches clear floor space at the ends be provided.

A practical difficulty arises here in that the position of the supporting columns in a large proportion of existing Leavers and plain net factories makes it impossible to allow as much as three feet between the machines. In such cases, and in cases where there are obstructions which cannot be removed without major structural alterations, a minimum standard of two feet between the nearest point of one machine and another, and between the nearest point of the machine or jacquard and the wall is advocated. The Working Party regard this lower standard, however, as only partially satisfactory, and consider that all firms planning new factories and those occupying premises where it is possible should adopt the higher standard.

(*b*) The encouragement of all firms to adjust their conditions to these standards, even where this implies the extension of premises and the undertaking of new building.

(*c*) The prohibition of the opening of any factory premises producing lace products which do not conform to these standards.

(*d*) The provision of all possible assistance other than grants in direct financial aid to firms seeking to alter, extend or build premises in order to conform to these standards.

(*e*) After a date to be fixed in the light of what is practicable under the circumstances, these standards to be made obligatory in all factories.

(36) That to stimulate the building of new premises and the enlargement of existing ones, the initial allowance for taxation purposes under the Income Tax Act of 1945 be increased to 20 per cent, and the annual allowance to three per cent.

(37) That to assist the rehousing of small firms unable to undertake building operations, local authorities consider the erection of 'flatted' factories containing provision for communal welfare facilities, for the occupation of such firms.

(38) That small firms in unsuitable premises unable to undertake building operations on their own account should give serious consideration to the possibility of combining together to erect 'flatted' factories for their joint occupation, containing provision for communal welfare facilities.

F. RECRUITMENT AND TRAINING

The Working Party consider that the industry is without doubt faced with a grave shortage of labour of all types, and that not only is there little chance over the industry as a whole, even under the most favourable conditions, of a return to more than 75 per cent of the pre-war labour force, but that, in view of certain unattractive features of employment in the industry and the extremely unsatisfactory age composition of its present labour force, vigorous and concerted efforts will be necessary to achieve even the 75 per cent level. The Working Party's recommendations for improving the attractiveness of working conditions are grouped under the heading of Factory Premises and Welfare (Recommendations 33 to 38). Recommendations 26 to 32 under the heading Distribution are designed, among other things, to ensure that the uncertainty of employment which has characterized the industry at certain times in the past will not recur; their recommendations throughout are based on the assumption that earnings throughout the industry must compare satisfactorily with those offered in comparable occupations. They make the following recommendations with regard to entrance into the industry.

(39) That the various sections of the industry devote attention to the best means of drawing the notice of juveniles and their parents to suitable openings in the industry (e.g. by films and visits to factories).

(40) That the training of juveniles in the industry be further developed.

(*a*) That the training provided for designers and draughtsmen at the Nottingham College of Art and Crafts be still further developed and that the present two-years' full-time course be extended to three years, a Diploma or Certificate being awarded on examination at the end of it to successful candidates. The opening of courses in other parts of the country (e.g. the Scottish area) may prove to be desirable in the future.

(*b*) That the Nottingham College of Art and Crafts, and other educational bodies in lace-producing areas, should co-operate closely with the Design Committee and the Design and Fashion Centre recommended in 52 below, e.g. in the provision of short-term courses for designers in other industries who may be interested in lace design, and in the setting-up of refresher courses.

(*c*) That the facilities for the training of operatives at the Nottingham and District Technical College be extended, that facilities for technical education be made available in the other important lace-producing centres and that a Diploma or Certificate be awarded to students completing an approved course. The course should be planned by the local education authorities in consultation with both sides of the industry, and should be adaptable to meet the needs of all sections.

(41) That students in the last year of the courses for either of the Diplomas or Certificates referred to above should be eligible for deferment from National Service until they have had the opportunity to complete their course.

(42) That steps be taken to improve and systematize the training of juveniles within the factories and that (where this has not already been done) the whole question be reviewed by the Employers' Associations and Trade Unions of the various sections.

(43) That the industry investigate, in consultation with the British Institute of Management, the desirability of instituting or participating in courses in the various techniques of management developed during recent years for the instruction of foremen, overlookers, managers and the younger executives throughout the industry.

(44) That the advantage to the industry of recruiting into its managerial ranks some men of scientific training be borne in mind.

(45) That, in view of the impossibility under present conditions of building up an adequate labour force from juvenile entrants alone, adult training schemes be investigated by both sides of the industry in consultation with the Ministry of Labour and National Service, and that all possible steps be taken to recruit adult workers.

(46) That systematic attempts be made in consultation with the regional offices of the Ministry of Labour and National Service to recruit and train women workers in areas where they are available, to carry out the processes for which they are suitable, preferably in workrooms established locally.

(47) That the best use and means of recruitment of part-time women workers be investigated.

G. DESIGN

Questions of design have always been of major importance to most sections of the machine-lace industry as they were to the great hand-lace industry from which it originated. Its continuous problem is to build on the traditions inherited from the past, but with due regard to the trends of the present. The Working Party aim in their recommendations on the one hand at facilitating the solution of this problem within the industry, and on the other at stimulating an informed interest in good design in lace among a wide public which in recent years has given too little thought to it. Their recommendations are concerned firstly with the designer, his recruitment, training and status, and secondly with the steps

which can be taken by certain sections of the industry to focus attention on questions of design both within and without the industry. In addition they make a recommendation about the protection of rights in design.

They recommend:

(48) That the facilities available for the training of designers at the Nottingham College of Art and Crafts be still further developed and should extend to short courses for designers in other industries and to refresher courses planned in conjunction with the Design and Fashion Centre (see Recommendation 52).

(49) That steps be taken through the Design and Fashion Centre to arouse the interest of designers in other industries in the possibilities of lace design.

(50) That the employment of well-known design experts as consultants be considered by the larger firms or by sections of the industry as a whole.

(51) That the importance be recognized by all employers of designers of giving them conditions of work conducive to artistic production, including opportunities to obtain stimulus from contacts with other centres of lace production or with designers in other industries.

(52) That in order to focus the industry's interest in design, and to disseminate informed interest in lace design among buyers, trade journalists, and the general public, the following steps be taken in consultation with the Council of Industrial Design by the sections producing fancy laces and lace furnishings in combination, together possibly with that part of the Plain Net section interested in dress net:

(*a*) A Design Committee be formed.

(*b*) A Design Officer be appointed responsible to this Committee.

(*c*) A Design and Fashion Centre be set up in the West End of London under the control of the Committee and the Design Officer to study design in relation to the industry; to study trends of style in related industries; to collect and to bring to the notice of machine-holders and finishers, samples of lace of foreign manufacture, and of products of industries related to or in competition with lace products; to hold or organize participation in exhibitions, and to commission designs which would be at the disposal of the trade and which might be exhibited as practical illustrations of the kinds of design to which the Centre wishes to draw attention.

(53) That the cost of the above arrangements be defrayed out of the compulsory levy referred to in Recommendation 63.

In considering the problem of the protection of rights of design, the Working Party have come to the conclusion that the only useful measures which can be taken are in connection with the registration of designs, which has proved a slow and cumbrous method of establishing priority.

(54) They recommend that the industry consider the system in operation in France and Switzerland whereby samples are deposited in sealed and dated envelopes with the local chamber of commerce for examination in case of disputes.

This system appears to have advantages over that of Registration as in operation in this country, both as regards expense and speed of reference.

H. RESEARCH

The importance of well-co-ordinated research in enabling an industry to solve its problems and to adapt to its use discoveries made in other fields of activity requires no elaboration. In industries like the lace industry, in which the productive unit is for the most part small, the rôle of research carried out on behalf of the industry as a whole, as distinct from that carried out within individual firms, is large. The lace industry has already shown its recognition of this fact by a tentative but valuable advance into the field of organized research by the establishment of a Research Council. The Working Party believe that this advance should be pushed still further. They recommend:

(55) That the industry contribute to the finance of co-operative research from the funds raised by compulsory levy (see Recommendation 63 below).

(56) That, during the years covered by their three years' agreement with the Committee of the Privy Council for Scientific and Industrial Research, they increase their contribution sufficiently to qualify for the maximum assistance under the agreement, thereby providing a total annual income of £14,000 in the place of the Research Council's present rather precarious income of £4,500.

(57) That, in view of the importance to the industry of research into matters the solution of which demands engineering knowledge, a scientist with experience of engineering and physics be added to the full-time staff of the Research Council.

(58) That the possibility of co-operation with the machine-builders in these investigations be explored with the advice and assistance of the Government Departments concerned.

(59) That for reasons given in Chapter XII an Economics Section be added to the Research Council.

(60) That the industry consider at an early date the expansion of the Research Council into a fully-constituted Research Association under the Department of Scientific and Industrial Research, with an adequate staff, laboratory and workshop.

(61) That this extension of the scope of co-operative research should be accompanied by increased rather than diminished activity in the research carried out within individual firms, whether carried out by each firm separately or by the co-operation of several firms for the solution of a common problem.

(62) The Working Party would also wish to draw the attention of firms to the value of scientific training in the higher ranks of industry (at present almost entirely lacking), though they would not of course wish to stress this type of training to the exclusion of all others.

I. RELATIONS OF GOVERNMENT AND INDUSTRY

(63) The Working Party recommend that powers be sought to raise a compulsory levy to cover:

(i) Scientific and technical research.

(ii) Economic and market research.

(iii) Overseas sales promotion.

(iv) The establishment of a Design and Fashion Centre.

(64) They suggest on pp. 138–9 above an organization for the administration of this levy in which the Board of Trade and the industry would be represented and in which provision would be made for the nomination of certain persons from within or without the industry on the basis of personal qualifications alone. The organization suggested is designed to ensure due consideration of the objects common to more than one section of the industry, and at the same time free development of those interests peculiar to the individual sections.

(65) They recommend that contributions to this levy should be allowable against income tax and that the organizations administering it should not be assessed for taxation.

The Working Party, though they have suggested certain extensions of, and additions to, the bodies representing the various sections of the industry, several of which involve representation of both sides of the industry and some of which also involve the presence of individuals selected from without its ranks, recommend:

(66) That the setting-up in the lace industry of a permanent tripartite body to keep under review the problems of the industry as a whole and to over-see its co-operative activities, would not be of service to the industry. They believe that many of the problems of the various sections of the industry must be solved on a sectional basis, and that a tripartite body for the whole industry would be more likely to lead to delays than to vigorous action.

They believe, however, that a periodic review of the problems of the industry has high value, particularly since the present Working Party has met at a time of uncertainty and rapid transition.

(67) They therefore recommend that some five years hence a body similar in its composition to the present Working Party should be appointed to review the progress of the industry and to make further recommendations upon it.

Summary of Principal Recommendations

THE Working Party consider the following to be the most important of their 67 recommendations:

No. (3) recommending the provision of improved statistics for the industry.

(Action by Board of Trade in consultation with the industry.)

No. (4) recommending the setting-up of up-to-date spinning mills in Development Areas on a co-operative basis to provide a few counts of yarn in heavy demand by certain sections of the industry, and thus to relieve the longer-term threat of raw material shortage.

(Action by the Trade Associations of the sections concerned in consultation with the Board of Trade.)

Nos. (8) and (9) recommending gradual reconditioning and replacement of machines and improved maintenance of machinery in use.

(Action by individual firms.)

No. (12) recommending the general adoption throughout the Lace Furnishings section of the Scottish methods of labour deployment.

(Already agreed in principle by the Employers' Associations and Trade Unions concerned; action by individual firms.)

Nos. (13) and (14) recommending the setting-up of machinery under the aegis of the Research Council for the testing of certain proposals for increasing the productivity of labour in the Plain Net and Leavers sections, and for testing any other proposals brought forward for increasing productivity.

(Action by Research Council in co-operation with the appropriate Employers' Associations, Trade Unions and Board of Trade.)

No. (23) recommending the drawing up by the various sections of the industry of programmes of requirements of replacement parts and new machines over a fixed period, and the reservation of the capacity of the machine-builders necessary for this purpose.

(Action by the Board of Trade, the Ministry of Supply, and by the Trade Associations concerned, particularly that of the machine-builders.)

No. (63) recommending that powers be given to raise a compulsory levy on the industry to be applied partly in a centralized and partly in a sectional manner.

(Action by the Board of Trade and the Trade Associations concerned.)

No. (29) recommending that part of such levy be used for schemes of co-operative market research and publicity in overseas markets on behalf of certain sections.

(Action by the Trade Associations concerned and by the Board of Trade.)

Nos. (52) and (53) recommending the setting up of a Design and Fashion Centre in the West End of London to be paid for out of the compulsory levy.

(Action by the Trade Associations concerned in co-operation with the Board of Trade and the Council of Industrial Design.)

Nos. (55) and (56) recommending increase in the provision for scientific and technical research, to be financed out of the compulsory levy.

(Action by the Trade Associations concerned in co-operation with the Department of Scientific and Industrial Research.)

No. (31) recommending joint measures for the maintenance of standards for the protection of the consumer against deception.

(Action by the Trade Associations concerned and the Board of Trade.)

No. (32) recommending measures for ensuring increased continuity of production, including some that might be considered when the war-time concentration arrangements are being terminated.

(Action by the Trade Associations concerned, by the Board of Trade and by other Government Departments.)

No. (33) recommending measures for increasing the attractiveness of employment in the industry.

(Action by individual firms.)

No. (35) recommending the laying down of standards for the spacing of machines which should, when this becomes practicable, be made compulsory.

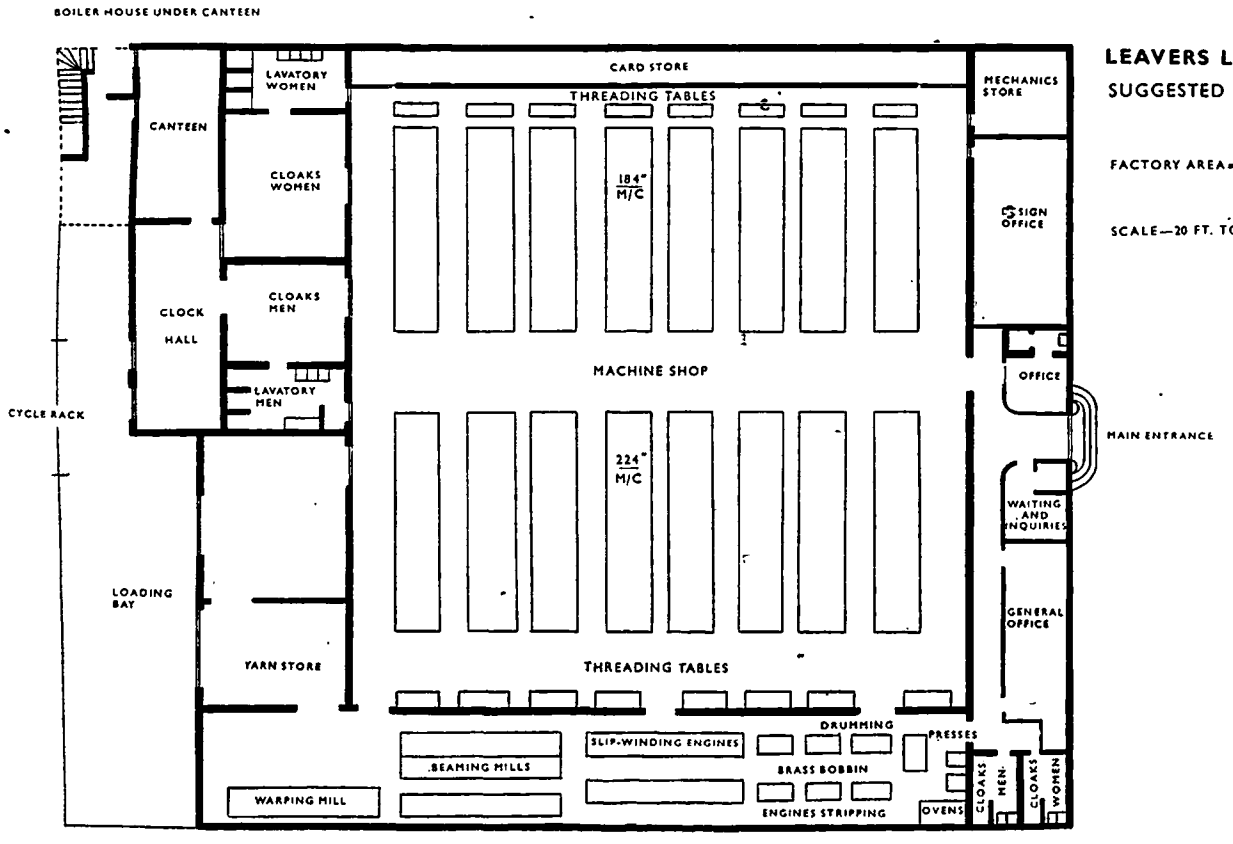
(Action by the Board of Trade and appropriate Government Departments.)

No. (40) recommending further developments in the training of juveniles.

No. (45) recommending the institution of methods for the training of adult entrants.

(Action by Employers' Associations and Trade Unions concerned in consultation with the local education authorities and the Ministry of Labour and National Service.)

No. (67) recommending a further review of the industry by a tripartite body in five years' time.



LEAVERS LACE FACTORY

SUGGESTED LAYOUT FOR 16 MACHINES

FACTORY AREA = 24,702 SQ. FT.

SCALE—20 FT. TO 1 IN.

APPENDIX I

CAUSES OF BREAKAGE OF THREADS

THE Production Sub-Committee of the Working Party made some inquiries into the causes of breakage of threads. They obtained the following analysis from a plain net firm which had recently carried out a detailed investigation in its works.

SUMMARY OF CAUSES

(1) Bad material—thick and thin places in threads—yarn of different elasticities and tensile strength.

(2) Slack bobbins—incorrect tensioning during bobbin winding.

(3) Tight warp threads—unequal tensioning of yarn preparation.

(4) Wide bobbins—soft-sided bobbins or thread diameter slightly higher than normal—tend to cut warp threads.

(5) Damaged bobbins—burred edge cuts warp threads or burred edge catches nib of spring preventing rotation and breaking carriage thread.

(6) Strained carriages—twisted or bent—carriage toe cuts warp or carriage lying to one side makes the points miss the thread.

(7) Carriage spring to one side—cuts warp threads—first cause is careless extraction of bobbins from carriages.

(8) Springs grooved by wear—threads (especially larger threads) torn or stripped on the sharp edges of the groove.

(9) Bobbins closing on to nib of spring—bobbins damaged by pressure used in baking operation.

(10) Lace machine not properly adjusted—guide bar out of position, putting warp threads out of line with consequent cutting by carriages.

(11) Warp too tight—excessive stress on tightest threads breaking those with low elasticity.

(12) 'Short wires'—group of 144 bobbins runs out too early—carelessness in bobbin winding.

(13) Large knots—especially heavy threads runs on fine gauge machines.

(14) Waste in bobbins—double threads—carelessness in drum winding and hank winding and inattention in bobbin winding.

(15) Bad carriage lubrication—greater pull required to turn wheel in carriage.

APPENDIX II

VISIT TO FRANCE

A DELEGATION from the Working Party, consisting of the Chairman, Messrs. Aird, Auld, McMeeking, Parker, W. I. Taylor and Worswick, with the Secretary, visited the main lace-producing centres of France in the week 29 September to 5 October 1946. Their thanks are due to the officials of the British Embassy in Paris, the Consul-General in Lyons, and the British Consul in Lille, who spared no pains in organizing a very comprehensive tour in the short time available, and not least to the French lace industry for the warmth and generosity of its welcome. They had the benefit of discussions with M. Jazet, Secretary of the Confederation des Fabricants des Dentelles, Tulles, Guipures et Broderies, in Paris, and with M. Caron and other prominent lace-producers in Calais and other centres, as well as the opportunity to visit a number of factories. The delegation were most impressed by the friendly greeting of the French lace manufacturers and Trade Union representatives, and by their willingness to discuss problems of mutual interest.

In general, conditions in France are very similar to those found in this country. Factories range from the old crowded tenement type to modern buildings. There are very old machines as well as the comparatively new ones erected to replace those destroyed in the 1914–18 war. A common feature of factory layout, not usual in this country, is the placing of winding and mending operations on the floor above the machine shop—an arrangement which keeps the auxiliary operations away from the noise of the machine shop but considerably increases handling. A higher ratio of men to women was found in most factories. The main point of interest in labour deployment was that the 'Scottish' method was the rule in Lace Furnishings factories. The structure of the industry is not dissimilar; commission dyeing and dressing is the rule, though two machine-holding firms are known to have their own dressing plant. The main difference in structure is found in the French Leavers industry, where the division of function between machine-holder and finisher has almost entirely disappeared. No doubt the process of integration was assisted by the fact that the bulk of the French Leavers output goes to a single market, the U.S.A., by contrast with the multiplicity of markets which the British finisher must cater for. Points of special interest on these subjects, together with a description of the French arrangements for the training of designers and operatives, are noted in the relevant chapters of the Report.

One of the most notable features of French lace is the excellence of its design. In spite of the limitations imposed by raw material difficulties, the delegation saw laces of striking beauty being made, and manufacturers showed a keen appreciation of the importance of design, as is evidenced by the support given to the admirable design school in Calais, described in Chapter XIV. The work of the specialist designers employed by lace manufacturers is supplemented by the purchase of designs from Paris designers for adaptation by the factory's own designer.

The major problems, especially those of materials and labour, are similar in both countries. A general shortage of labour is expected in France, and the fact that it has not yet affected lace production is due to the very low level of yarn supplies. It is abundantly clear that for some years to come the combined output

of the two industries will fall far short of meeting world demand for lace, and that a free interchange of ideas will be of the greatest value to both industries in the solution of their common problems, and in the longer run in maintaining a stable level of demand. The Working Party have noted with satisfaction that, in the course of the past year, two meetings have been held between the French and British lace manufacturers, and they trust that these meetings have laid the foundations of a long and fruitful co-operation.

The wages structure of French industry is worthy of note. A statutory minimum time rate for unskilled work is fixed nationally and is varied from district to district according to the cost of living. The employers and Trade Unions in each industry then draw up a schedule of jobs classified according to the degree of skill involved, and the appropriate increase over the basic minimum rate is agreed upon for each job. Subject to this statutory minimum time-rate, piece rates are commonly paid, and piece-work earnings average 25 to 50 per cent more than time rates. Women receive the same rates as men where the work is equal, and 90 per cent where it is not.

The Trade Unions, which are organized on an industry basis, have considerable power. It is compulsory for a factory employing more than 50 to have a joint production committee formed largely of workers' representatives with the proprietor in the chair.

So far as the delegation could judge, wage rates in the French lace industry at the time of their visit were roughly equal to the rates in this country, but the future position will depend upon the relation between French wage rates and the value of the franc.

The following establishments were visited in France:

M. Roussell—Brassac-les-Mines
Bonnet frères (Cézabat)—Clermont Ferrand
M. Blanc—Le Puy-en-Velay
M. Fontanille—Le Puy-en-Velay
M. Sidoux—St. Quentin
La Cottonière (M. Trocmé)—St. Quentin
Maison Cliffe—St. Quentin
M. Dehaussy—Caudry
M. Edouard Beauvillain—Caudry
M. Gaston Grassard—Caudry
Charpentier et Preux—Caudry
J. Détant et Delplace et Cie—Calais
F. Sury—Calais
Knecht Boot et Cie—Calais (Dyers and Dressers).

APPENDIX III

STATISTICS

IN the course of our inquiry, we were asked by the Statistics Division of the Board of Trade to make recommendations on the future Census of Production and the collection of short period statistics. Recommendations were made in July 1946. They concerned only the Census of Production.

In the foregoing Report several references are made to the inadequacy and inaccuracy of the Trade Returns. It seems desirable to make suggestions with regard to their improvement. At present the classification of exports is as follows:

(*a*) Lace curtains, in the piece or not, of cotton.

(*b*) Lace net of cotton.

(*c*) Lace, other sorts, of cotton.

(*d*) Lace and lace net, wholly of silk.

(*e*) Lace and lace net of silk, mixed with other materials (including artificial silk).

(*f*) Lace and lace net wholly of artificial silk (including staple fibre and waste).

(*g*) Lace and lace net of artificial silk, mixed with other materials (excluding silk).

(*h*) Lace and lace net (except embroidery) and materials resembling lace and lace net not elsewhere specified.

The principal weaknesses of the present returns are as follows:

The Trade Returns do not distinguish the exports of each *section* of the industry (e.g. Leavers, Lace Furnishings).

It is not clear how far made-up articles, containing a proportion of lace, are included.

There is a substantial export trade by parcel post which is not recorded separately.

All types of rayon are included under the misleading title of artificial silk.

(1) We consider it most important that the returns should distinguish between the exports of the sections of the industry. Without such information, the measuring of the success of export promotion, which we recommend should be undertaken by sections, would be very difficult. Exports should therefore be classed by machine of origin (e.g. Leavers, embroidery).

(2) Lace is used in a variety of ways and in varying proportions with other textiles, to make furnishings, garments, etc. To trace every piece of lace exported in a made-up article is clearly impossible. But we consider that where the article contains lace to the extent of more than 50 per cent of the value of the materials used in the article, it should be classified as lace.

In the light of the above, we suggest that the data should be classified according to the following principles: (1) machine of origin; (2) type of product; (3) raw material: cotton, silk, rayon, other materials and combinations thereof.

It is not possible to obtain details of exports by parcel post other than by asking individual firms for the information; here we suggest that the trade associations should collect regular statistics of such sales.

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